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Verdict on Canada's Congress

THE Sixth Commonwealth Mining and Metallurgical Congress opened at Vancouver on Sunday, September 8, and ended at Halifax on Wednesday, October 9, just over a month and some 5,000 miles later. Throughout this period the number of delegates in attendance fluctuated between 500 and 700. They came from practically every Free World country with the exceptions of India, Pakistan and Burma, which sent no official delegates. There was a very large contingent from the United States.

Looking back on an unforgettable experience, the verdict must be that the Congress was extremely rewarding, but very much a test of stamina. Canada is so huge, and its mining industry so extensive and varied, that there is scope in the Dominion for three separate congresses at least, so that the programme was inevitably rather overloaded.

The thanks of the mining industry are due to the Congress organizers, ably assisted by the Canadian Pacific and Canadian National Railways, whose efficiency was quite outstanding. Not only were the organization and hospitality in the big cities of the very highest standard, but, if anything, they were even more remarkable in the smaller mining camps, whose resources must have been severely strained by the large number of delegates to be entertained. It may not be generally realized that, although delegates paid part of the expenses of the tours, they were heavily subsidized by the Federal Government, the Provincial Governments, and individual mining companies.

To many delegates one of the most valuable features of the Congress was that it served as a refresher course and also as a medium for the exchange of ideas. The organizers deliberately avoided the formal presentation of technical papers (which will appear with the official Congress literature), but they encouraged informal discussion wherever possible.

Particularly impressive was the extremely pleasant atmosphere which prevailed throughout the proceedings. Long before the Quebec frontier had been reached, nearly all delegates were on the footing of Christian names and many friendships which will endure were struck up between delegates from different countries.

To engineers the greatest interest lay probably in the special problems that face Canadian mining and the unusual and ingenious ways in which they are being overcome. The vitality of the mining industry is tremendous and Canadians are very experimentally-minded and never afraid to tackle something new. As a result they are contributing to mining knowledge, even by their mistakes. In view of their high labour costs they are certainly keen on any form of mechanization and at the present time trackless mining is being given quite an extensive trial under various conditions.

In the field of exploration every modern tool is being employed, especially air-borne instruments. Aircraft have become completely part of the everyday thinking of Canadian mining. Mining companies either have their own aircraft or rely on the services of the various chartered companies. They are no less enterprising as regards communications—for example, it is quite usual to find jeeps equipped with Walkie-Talkie in spread-out

properties. The same readiness to try anything new is apparent on the mineral dressing side and much ingenuity is being shown in overcoming climatic difficulties; e.g., by using waste heat from other processes to control the temperatures of plants that could freeze up. Some fine work on the development of new mineral dressing processes is being done by the Federal Mines Branch, Ottawa, whose new research laboratories were very greatly admired by the many delegates attending the opening ceremony on October 1.

A subject which roused much interest was the effect of the present system of tax write-off holidays on the industry. It obviously has the effect of bringing new properties to production very rapidly, but in some respects it leads, perhaps inevitably, to some rather wasteful mining.

Also interesting is the nomadic flavour of Canadian mine labour and the extremely high turnover, which frequently exceeds 100 per cent per annum and is understood to be still higher in some mining camps. Bachelors working for a mining company usually live in bunk houses, but married men and their families often live in trailers, thus taking their homes to the job. In their efforts to develop stable labour forces many companies are now providing such amenities as community centres. On the housing side, however, it seems to be the general policy to put up no houses for labour (other than the bunk houses for bachelors and houses for senior staff), but to assist and encourage workers to build houses of their own.

The effect of the present base metal slump on the Canadian mining industry is still unpredictable, as is the outlook for uranium producers after 1963. The base metal picture—especially as regards lead and zinc—is obscured by the fact that some mines have a fairly high percentage of silver in their ores. A hardship to which attention was drawn by a number of mine managers is the premium on the Canadian dollar, which is equivalent to a levy of 5 per cent on export sales. Overall, the industry appears to be in financial trim to weather a base metal slump provided it is not too protracted. It is possible, however, that quite a few of the weaker companies might go to the wall owing to excessive working costs or inadequate financial resources to see them through.

Another problem, which Canada shares with the rest of the world, is the shortage of engineers and geologists—a point which was stressed by the President of the Congress, Mr. R. W. Diamond, in his inaugural address. This situation is certainly not due to lack of university facilities, which are magnificent.

So far as mining machinery is concerned, delegates found that there is no prejudice against equipment of British manufacture. On the other hand, Canadian mine equipment planning usually calls for standard machines that can be bought "off the shelf" from U.S. or local manufacturers. Mining companies often buy bigger machines than they need with a view to future expansion, and quick deliveries are desired. Interchangeability is an important requirement and for this reason American-type threads are preferred.

In general, the industry prefers equipment that is well tried or is getting good results in operation. One Canadian suggested that, if British manufacturers wished to establish themselves in the Dominion, they could scarcely do better than form a consortium and equip a mine completely. If the machines were good, they would soon get talked about. A similar principle has been successfully adopted by one large British sales organization, whose policy is to establish itself very thoroughly in a particular mining field, from which it can spread with the reputation of its products.

COLONIAL GEOLOGICAL SURVEYS 1947-1956

On January 1, 1947, a central organization for overseas Geological Surveys was inaugurated in London by the appointment of Dr. F. Dixey as Geological Adviser to the Secretary of State for the Colonies and Director of Colonial Geological Surveys.

The progress of the Directorate of Geological Surveys during its first ten years of operation has been reviewed by Dr. F. Dixey *(Colonial Geological Surveys 1947-56,* H.M.S.O., price 10s. net). During that period the total number of senior officers engaged overseas has been increased from 50 to 212 and there has been a corresponding increase in the junior staff. This great increase in staff, largely financed from Colonial Development and Welfare funds, coupled with the provision of aerial photographs of much of the area of the territories concerned, has been responsible for a very large increase in basic geological mapping.

Very few Colonial territories had accurate topographic maps before 1947 at scales as large even as 1 in. to 1 mile. Geologists were consequently obliged to make their own maps by conventional plane-tabling and traversing methods; yet even then they were usually handicapped by the absence of any reliable trigonometrical network to which their work could be tied. A fundamental change in geological mapping has since resulted from the advent of aerial photographs and the establishment of the Directorate of Colonial (Geodetic and Topographic) Surveys, with the task of producing topographic maps from these photographs. Geologists are thus relieved of much of their topographical mapping and eventually they should be free to concentrate with increased speed and accuracy on the geological side of their work. Considerable time must elapse, however, before topographic maps can be made available for all parts of the Colonial territories.

Important results have been achieved in the field of mineral investigations. With due allowance for the earlier work of the Geological Survey Departments in the various territories overseas, the Colonial Geological Surveys have been directly or indirectly responsible for the discovery and/or preliminary investigation of a number of major mineral deposits now in production or approaching production. These include the Sukulu apatite-pyrochlore, the Busumbu phosphate, and the Kilembe cobalt-copper of Uganda; the columbite in weathered granites of Northern Nigeria, and the lead-zinc deposits of south-eastern Nigeria; the ilmenite-rutile of Sierra Leone; the manganese of British Guiana; the gypsum of Jamaica; and the manganese of Fiji.

Other deposits now under active investigation by mining companies with a view to production include a number of East and Central African carbonatites containing apatite, niobium and rare earth minerals, and vermiculite; also gypsum in the Somaliland Protectorate, ilmenite-rutile in southern Nyasaland and bauxite in Sarawak. Among major deposits of potential importance are the coals of Tanganyika, investigated by the Colonial Development Corporation, and those of Northern Rhodesia, Bechuanaland, Swaziland and Sarawak; iron ores in Tanganyika, the Gold Coast, Swaziland and Jamaica; and the niobium- and uranium-bearing pyrochlore-granite of Northern Rhodesia. Moreover, the Geological Surveys have played an essential part in the establishment of cement industries in all the East and Central African territories as well as in Nigeria.

The actual and potential values of these major deposits—apart from many smaller deposits—and their importance in the general development of the territories in which they are situated, are clearly far greater than the sums—

including about £2,500,000 from Colonial Development and Welfare funds—spent on the expansion of the Colonial Geological Surveys since World War II.

The scope and effectiveness of the organization, both in the field of mineral economics and in chemical and technological research, was greatly widened in April, 1949, by transfer of the Mineral Resources Department of the Imperial Institute to the Headquarters Organization. Throughout the decade under review the Mineral Resources Division paid particular attention to carbonatite complexes and it has done much to stimulate interest in these potentially economic deposits. Its quarterly bulletin, *Colonial Geology and Mineral Resources*, has made great progress and is to-day regarded as one of the major geological periodicals of the world.

The Division's Geological and Mining Section constitutes a major source of information on all aspects of the mineral industry; notably the nomenclature, nature, properties, production, treating, testing, specifications, prices, tariffs, markets, uses, substitutes, and sources of minerals. Its Chemical and Testing Section has carried out many analyses on a wide range of rocks and minerals, mainly on behalf of the overseas Geological Surveys. Of special importance has been the work of the Statistical Section, whose *Statistical Summary of the Mineral Industry* is an annual publication of the greatest value wherever authoritative records of production, exports and imports of minerals and metals are required.

Among other directions in which the Directorate is contributing to the exploitation of mineral wealth is by providing regular annual courses which can be taken by young geologists before leaving for their first tour overseas. These include courses on photogeology, sedimentary petrology, and the elements of geophysical prospecting.

This record of achievement is the more impressive when it is recalled that, starting in 1947 on a modest scale, the Directorate had to build up its central organization in London. Moreover, the eleven Colonial governments which already had Geological Survey Departments were urgently in need of more geologists, geophysicists and geochemists, with the necessary additional buildings and equipment. In thirteen other territories it was necessary to set up new Geological Surveys. The Directorate embarks upon its second decade with an organization and facilities which, if by no means fully adequate for such a wide field of activities, have been enormously expanded and strengthened since 1947.

DIAMOND PRODUCTION IN TANGANYIKA

One of the most important events of Tanganyika's mining year in 1956 was the completion of the large new treatment plant by Williamson Diamonds Ltd., which has significantly improved the future outlook for the territory's diamond industry. This plant was brought into production in March last year at the Mwadui Mine, from which 97 per cent of all diamonds exported from Tanganyika are derived.

Due to teething troubles the new plant had not reached full capacity by the end of last year, but the quantity of gravel treated was more than three times greater than in 1955, enabling the grade to be reduced by nearly two-thirds.

The plant has a designed capacity of some 7,000 to 7,500 tons of gravel a day and employs heavy-media separation and grease belts. It is fed by a conveyor belt 10,000 ft. long (one of the longest in Africa), which transports the diamondiferous gravels from the workings, where the principal excavator unit is a 6½ cu. yd. electrically-operated walking dragline. To ensure adequate supplies of water for the mine the construction of a new dam was undertaken on the Nhumbu River in 1955. The dam was completed during last year with a capacity of 1,800,000,000 gals. and was the third to be built for this purpose.

Tanganyika's diamond production and exports are summarized by the Department of Mines in its annual report for 1956. Production of cuttable and industrial rough was 358,717 m. cts., an increase of 33,194 cts., compared with the preceding year. Exports totalled 357,538 cts., valued provisionally at £2,855,273. This represented an 11 per cent increase in weight exported but an estimated 11 per cent decrease in total value compared with 1955. This analysis, however, does not present an entirely accurate picture of the year's results, since a number of the larger and more valuable stones exported had not been valued by the end of December. Another factor reducing the average value per carat, and hence the overall value of exports, was the higher proportion of smaller and less valuable stones recovered, due to the greater efficiency of the new treatment plant at Mwadui Mine.

It will be recalled that in March last year a new sales contract, expressed to run until December 30, 1960, was concluded between Williamson Diamonds Ltd. and the Diamond Corporation Ltd.

COAL RESOURCES OF THE U.S.S.R.

An article by I. Molchanov and A. Tyzhnov, published in a recent issue of the newspaper *Promyshlenno-Ekonomicheskaya Gazeta*, claims that the Soviet Union has the richest coal resources in the world.

In 1931 the country's coal deposits were estimated at 640,000 million tons, and in 1937 at 1,654,000 million tons. The Soviet Union then occupied second place in the world, after the United States, for coal deposits. Before 1917 Russia had occupied fifth place.

A reassessment of Soviet coal deposits was made in 1956 and they were estimated to amount to 7,000,000 million tons.

"It is true," write Molchanov and Tyzhnov, "that the calculations were made, in accordance with the accepted international rules, down to a depth of 1,800 m., which is as yet not readily accessible for development. Furthermore the industrial exploitation of part of the deposits presents difficulties.

"This notwithstanding, it can be said with confidence that the Soviet Union possesses the richest coal resources in the world. The deposits suitable for mining in modern conditions exceed 3,000,000 million tons, including those in the economically-developed areas, which amount to approximately 1,000,000 million tons."

The article points out that these resources are unevenly distributed. Nearly 85 per cent of all the deposits are on the territory of Western and Eastern Siberia, including the northern coal basins. The European part of the Soviet Union accounts for 7½ per cent and the Urals area for a one-hundredth part of 1 per cent.

The deposits in Siberia are not only the biggest but also the most suitable for industrial development. Very often the coal seams are from 160 to 260 ft. thick and are not very far from the surface, which makes it possible to develop them by inexpensive methods of opencast mining.

In his speech on November 6 at the Jubilee session of the Supreme Soviet, Mr. Krushchev forecast that in 1972 the U.S.S.R. output of hard coal would have risen to 650,000,000 tons from a total of 395,000,000 tons in the current year.

Human Behaviour in Coal Mines

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THE most complicated field can be brilliantly illuminated by one new idea, and the investigator should not be put off from attempting to find simple clues in industrial situations simply because these situations are regarded as complicated. The investigator must endeavour to look at the picture on a vast scale and from it to draw very simple conclusions.

In the tables (below, right) are set out some of the facts about industrial disputes in Yorkshire and South Wales. The criterion of classification is the size of the mine by the number of men employed and the variate we are measuring is the tonnage lost per man in disputes; these disputes include both strikes and go-slows. They exclude, however, coalfield strikes and are hence a measure of the extent to which the men in the individual mines will withdraw from their work over some disputed issue arising in their own mines. The figures confirm a general impression, namely, that strikes are diseases of big organizations.

The coalfield may be divided into three roughly equal classes of men : that third working in the 67 smallest pits, that third working in the 30 medium pits, and that third working in the 18 largest pits. Although there is the largest number of disputes over wages in the class of largest mines, the size effect for the non-wage issues is far more strongly marked. We may conclude from this extremely cursory examination of the facts that the size effect is very far from being a wages effect; this suggests that it cannot be imputed to agitators.

Accidents Among Coalminers and Quarrymen

The second set of illustrations is about the size effect on industrial accidents. Figures drawn from the coal industry and in the appropriate table set out some accident statistics for all the coalmines in South Wales during the year 1950. They show that the risk of having an accident if one is a miner in a large mine is about eight times as great as the risk of having one in the same period of time if one works in a very small mine.

It might be argued that the accident risk in the mines employing many men is high because these big mines are deep and highly mechanized; it is argued that machinery adds to the risk of injury. But this is not so. If one compares in any given year the accident rates in mechanized and non-mechanized mines working the same seams, one finds that the non-mechanized mines have the higher accident rates.

Absence From Work

The third set of illustrations of the size effect on industrial behaviour is drawn from the statistics of absenteeism. As is well-known, these statistics are frequently most unreliable and those of absenteeism among coalminers are probably most unreliable of all. Certainly any distinction between voluntary absenteeism (the deliberate absenting himself from work of a healthy miner) and involuntary absenteeism (the absence of a miner on the sick or injured list) is not a distinction on which any prudent man would attempt to base conclusions about patterns of attendance.

But the figures of total absenteeism, that is, the relation of all shifts lost to all shifts that could have been worked, whether by men at the coal face, elsewhere underground or on the surface, all expressed as a percentage, enable us to see whether the size effect is significant in determining how far men are willing to turn up to work. The relevant figures show that the size effect is extremely powerful. They express the average percentage absence in all small mines, that is, mines employing between 10 and 100 men, on the one hand, and all large mines, that is, mines employing over 1,000 men, on the other. The table gives the results for the year 1942 by the seven major coalfields; this was the last year before the industry was taken under government control during the war. It will be seen that in all cases the percentage of absenteeism in the large mines is much worse than that in the small; the difference is highly significant and accounts for about four percentage points of the national average.

This article is condensed from a paper entitled *The Analysis of Industrial Behaviour*, presented at Harrogate on July 1, 1957, at the Automatic Production, Change and Control Conference. The author is Professor R. W. Revans.

Management and Behaviour of Men

To cut a long story short, the size of the working group as well as the overall size of the coalmine is a factor in determining the way the men behave.

One can pursue this argument and show the most important factors in determining the behaviour of coalminers are these factors of organization; in my view, both the total size of the coalmine and the size of the working group are measures of the extent to which the management can know what is going on and can do something to control it. Where the commands of the managers and foremen are sufficiently compact or sufficiently well set out to enable them to do their proper job of providing the men with what they need to do their tasks, the men will respond by arguing less about the terms of their work, by turning up more regularly to perform it, and by withdrawing less frequently through suffering accidents.

It can be shown by rather sophisticated arguments that factors of management control are more important than

STRIKES AMONG COALMINERS
TONNAGE LOST BY DISPUTES, 1949-53, BY SIZE OF COALMINE

Yorkshire:

Manpower Group	*No. of Pits*	*No. of Disputes*	*Tonnage Lost*	*Disputes per 1,000 Men*	*Tonnage Lost per Man*
Below 500	28	79	42,100	11.1	5.94
501 - 1,000	25	275	168,953	14.6	8.97
1,001 - 1,500	20	386	399,240	15.8	16.39
1,501 - 2,000	21	482	454,285	13.6	12.82
2,001 - 2,500	8	256	282,282	14.4	15.98
Above 2,500	12	824	763,963	24.5	22.70

South Wales Bituminous Coalfield:

Manpower Group	*No. of Pits*	*No. of Disputes*	*Tonnage Lost*	*Disputes per 1,000 Men*	*Tonnage Lost per Man*
Below 500	35	204	123,229	16.0	9.69
501 - 1,000	40	575	437,997	15.9	12.14
1,001 - 1,500	23	525	389,833	20.2	15.01
1,501 - 2,000	6	172	244,321	16.4	23.39

what might be called environmental factors, such as the thickness of the coal seam or the depth of the mine. The statistics cannot, of course, say what it is that the management in the smaller or more closely organized mines can do which their colleagues in the larger or more loosely organized cannot do, but field studies of what actually goes on in the large pits suggest that the source of trouble is failure of communications.

Communication of Instructions

This is a simple concept: a manager distributes his authority around the coalmine, telling such and such persons that they may settle such and such matters. It is then the business of the organization to see that information about these matters gets to the people who are empowered to deal with them. In a large and loosely knit organization this communication becomes difficult. In consequence, the management is aware that operational problems exist without knowing precisely what they are, while the miners may get the impression that the organization is haphazard or even slipshod. The large unit is most susceptible to these failures of communication and it is there that the failure of morale is most likely to occur.

DISTRIBUTION OF ALL ACCIDENTS DISABLING FOR MORE THAN THREE DAYS AT ALL COALMINES IN SOUTH WALES, 1950, BY SIZE OF MINE*

Size of Mine by No. of Men on Books	*No. of Mines in Sample*	*No. of Accidents*	*Total Manshifts (000's)*	*Accidents per (000's) shifts*
Less than 4	41	5	21.66	23.1
5 - 8	20	11	29.18	37.7
9 - 16	22	33	63.25	52.2
17 - 32	20	86	110.7	77.7
33 - 128	10	242	206.3	117.3
129 - 256	25	2,005	1,348	148.7
257 - 512	42	6,336	3,844	164.8
513 - 1,024	68	21,664	12,865	168.4
1,025 and over ...	23	15,267	7,631	200.1

* The expected size groups 33 - 64 and 65 - 128 have been amalgamated since there are only ten mines altogether in the two groups.

The analysis of this paper shows that size, which is explained here as the degree of dilution of the manager's ability to take the appropriate operational decision, is more important than wages in determining what shall be the temper of the men. Indeed, a study made of the average wages per shift paid during 1953 to the miners showed that there is no significant difference between the average of those in the pits that go on strike and the average of those in the pits which do not go on strike.

The actual difference of about 1s. per shift in favour of the non-striking pits can readily be explained by the loss in bonus payments to those men in the pits that are the seat of trouble. Where men lack confidence in the ability of their managements to manage, they will express this lack in the only way open to them, namely, in an application for higher wages. Where there is only one battlefield one must expect all battles, whatever their cause, to be fought upon it.

Joint Consultation

We have heard much since the war of the importance of joint consultation as a means of bringing the men into the processes of management. Theories of joint consultation assume, however, that men *wish* to be consulted upon these affairs. It may very well be that a handful of them do, but for every dozen men in a coalmine who are interested in helping the manager to decide how to run it, there are probably a thousand who are more concerned to feel that their particular section of it is properly organized so that they do not have to waste their time or do unnecessary tasks

PERCENTAGE ABSENTEEISM IN LARGE AND SMALL MINES, 1942

Coalfield	*No. of Mines*		*Absenteeism %*	
	Smaller	*Larger*	*Smaller*	*Larger*
Scotland	108	12	5.65	7.50
Northern	92	45	6.72	8.41
Yorkshire	42	56	10.02	13.73
North Midland	27	35	9.05	14.19
Midland	61	20	7.71	13.45
Lancs. & North Wales	41	21	7.43	13.12
South Wales	79	29	7.51	10.98
Great Britain	450	218	7.15	11.66

Limited Appeal

Because of this, joint consultation concerned with overall administrative issues is not likely to appeal to more than a few. The majority want to know why it is that a particular instruction or a particular set of spares or a particular load of timber was misdirected at some time on a particular shift, because it was this specific failure that caused them embarrassment, inconvenience, or even loss of earnings.

It is this kind of detail that joint consultation, as it is generally attempted, was never designed to handle; it cannot be handled except by local consultation with that part of the management organization in charge at that particular point. Such local consultation demands, not new formulas or new committees, but a new attitude towards the delegation of authority. What might be called the smoothness of the horizontal flow of work and the willingness of the men to do that work are inextricably mixed. Hence, the division of the field of industrial problems is an illusion. There is one field of difficulty alone. Human relations depend upon the extent to which men perceive the work to be economically and effectively arranged; where this is not so, discontent will arise and it may eventually break out in a dispute.

The Optimum Level of Production

The picture that has been drawn is, of course, a gross over-simplification. Indeed, we all know that organization can be taken too far and that then men may again revolt. These cases are rare but they nevertheless exist. Their explanation is, I believe, along the following lines.

To derive satisfaction from work one normally needs to use one's intelligence in solving the little problems that arise from time to time. There is an optimum level of problem for all workers; with some even a simple challenge is too severe, with others a most difficult problem immediately attracts their whole attention. But if for any particular reason the challenges are too difficult for him to meet, the worker will become discouraged and will give up.

This, I believe, to be the case where the forces of vertical and horizontal disruption, as in the large and complex unit, are considerable, and where the work appears uncertain and ill-planned. When, on the other hand, the challenges that the individual encounters are too easy, his interest will flag and he will become bored. When he is bored he will find opportunities for escape from his boredom and these will normally take the form of organized revolt.

CAM AND MOTOR—II

Mining Methods at the Cam and Motor

Besides being the deepest mine in the Federation of Rhodesia and Nyasaland, the Cam and Motor is also the largest gold producer. The following article, the second of three, describes the mining methods employed at the property.

IN the past at the Cam and Motor, the bulk of all main level development was done on reef from waste cross-cuts radiating from the shafts to the lode zones. Side-wall failure and roof collapse in the lower levels after stoping had commenced were frequent, necessitating heavy timbering and resulting in poor ventilation conditions. New policy is to develop on stope drive horizon from footwall haulages, and to link the various lode haulages in ring-circuit for maximum air circulation. Stope drives, cut 6 ft. by 6 ft., follow reef contours, but main haulages cut 8 ft. by 8 ft., are aligned for loco-tramming.

Golden Bullet rock-drill machines are used for main development and S.L. 106's for secondary development and stoping. Airlegs are widely used and all drill steel is tungsten-carbide tipped. The burn-cut is standard for all development and cut-directors are being introduced. Standard explosive is 60 per cent gelignite. Ordinary safety fuse is used with No. 6 detonators and igniter-cord is now being introduced.

Main development cleaning is done with No. 12 B. Eimco loaders with 7½ h.p. air-motors and 3 cu. ft. buckets.

A standard layout for shaft stations with adequate tramming loops and siding facilities has been adopted for the new shaft with transformer stations, charging sets, sumps, magazines, ore-and-waste-passes and latrines sited behind the shaft in a crosscut connected to the main return airway. Main level interval was 100 ft. vertical, stepped up to 200 ft. below the 30th Level. Below the 40th Level (5,555 ft. below collar) this interval is reduced to 150 ft.

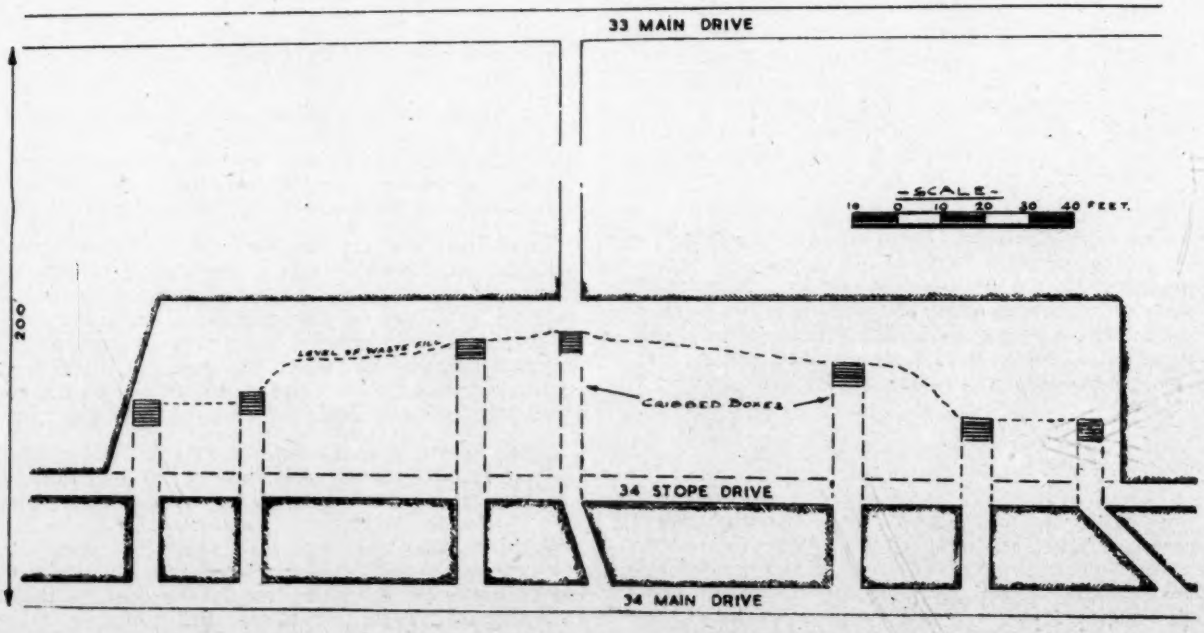
Shaft Sinking

The new Tertiary " A " Shaft is being sunk 500 ft. North of the Sub-Vertical Shaft. This shaft has been sunk from the 39th Level to the 42nd Level (5,855 ft.) with the hoist on the 39th Level and bank on the 40th Level. The shaft tip has been completed, with ore passes to the 40th Level, and the diagonally-opposed, permanent hoist chambers cut. The shaft is 14 ft. in diameter in the clear, partially concrete-lined from the 39th to the 40th Levels and at subsequent stations. A brow-box air by-pass is cut at each station.

The shaft will have two skip compartments, two cage compartments and a ladder and pipeway. Ladder platforms are of welded open-mesh steel construction to reduce resistance to air-flow. The H-section girders are not permanently grouted but are bolted to cleats pinned to the walls with roof-bolts, or set in pre-cast pockets in the concrete lining. Setts consist of three 6 in. by 3 in. dividers and a central 8 in. by 4 in. bunton.

The sinking hoist is 100 h.p. Holman with 1 ft. 10 in. by 3 ft. 6 in. dia. double drums, which hoist 20 cu. ft. kibbles. The round is drilled with a total crew of 13 natives using four Golden Bullets to drill a six-hole cut and approximately 64 easers and croppers. A daily advance of 3½ ft. is achieved with 3½ hours drilling time. Charging up time takes 1¼ hours, and lashing out by hand requires two consecutive 6-hour shifts, each employing 15 natives, including hoist drivers and door-boys. Total spoil per round averages 150 tons for a 15-ft. dia. excavation with overbreak. Electric blasting is used exclusively with Nos. 1 to 8 delay detonators.

In the upper levels open under-hand stoping was practised in all lodes, with the exception of the Motor. A new flat-dipping upper-level lode has recently been successfully mined by a combination of open under-hand and breast



A typical underhand cut and fill stope on the Cam and Motor mine.

stoping. For the Motor Lode and all lodes below the 23rd Level, cut-and-fill stoping is obligatory on account of ground conditions. The flat-back cut is standard but an experiment with a double-rill cut from a central pass is now being tried.

Roof and floor pillar removal in fill stopes is a fairly simple matter. The floor pillar is trimmed to about 8 ft. thick from below after the last lift is complete and the stope sand-filled as close as possible to the pillar backs. Starting from the main crosscut and retreating outwards to the stope boundary, the pillar is benched downward on to the sand, broken ore being lashed into boxholes or scraped up to drive level. Small slices about 12 ft. on strike are taken and alternately cleaned out and sand-filled to track level to maintain a level floor, advancing behind the retreating pillar.

When the boundary is reached the roof pillar is then retreated back to the main crosscut by the same system of vertical slices, using over-hand methods, it having been found by experience that the tightly-compressed sand in the upper stope hangs up before caving for far longer than is required to clean out the broken ore from a slice.

Hand-tramming is extensively used but loco-gathering on main levels for transport to shaft-bins is now the rule. Long distance waste- and sand-fill tramming is also by loco. Trucks are 16 cu. ft. side-tipping, on 20 lb. tracks for hand- and 30 lb. tracks for loco-tramming. Two types of battery loco are in use, Goodman type 86 and B.E.V. type W.217, each 4 h.p., 1½ ton with 400 lb. draw-bar pull. The Goodman uses 36-cell Edison Ni-Fe batteries of 225 amp.-hr. capacity and the B.E.V. 24-cell Exide Ironclad lead-acid batteries of 270 amp.-hr. capacity. Charging sets are maintained on each loco level.

Main Shaft bins are of the low-capacity brow-box type and are not interconnected. On the Sub-Vertical Shaft a series of interconnected ore- and waste-passes is being completed. The new shaft will have linked, off-station passes with transfer bins and measuring flasks to eliminate inter-level hoisting. Chutes are hand-operated Kimberley type, with the improved Rand-Mines model in the new shaft.

Ventilation and Dust Control

With the present depth of over 5,000 ft. an immediate sinking programme to 7,000 ft. and a probable ultimate target in the region of 10,000 ft., adequate ventilation is of prime importance. Estimated rock temperature at 7,000 ft. is 121.5 deg. F. Calculations showed that an initial quantity of 200,000 c.f.m. for the whole mine would be required to give comfortable conditions throughout, with effective cooling on the 40th Level for sinking operations. With sinking and exploration below the 40th Level well advanced, an increase to 500,000 c.f.m. would be necessary, and thereafter economics dictated that further cooling be achieved by some form of refrigeration rather than by increasing air volumes.

A start was made in November, 1953, on the creation of a new upcast airway through the largely worked out Petrol Lode which had been open-stoped by underhand methods. Sinking of a new upcast shaft from surface to the 2nd Level, excavation of the 2nd Level fan chambers, pillar removal throughout the lode and mining out of virgin low-grade areas between the 25th and 30th Levels was completed in March, 1956, at a cost of £27,113, including the installation in parallel of three 50 h.p. Macard Axial-Flow fans with a total capacity of 150,000 c.f.m.

Commissioning of the Petrol upcast allowed the Circular Shaft to downcast but the capacity of the two surface shafts was below requirements and excavation of a new main downcast airway had been started in May, 1954. This involved sinking a new downcast shaft in the Good Shepherd area to the 2nd Level, pillar removal in Good Shepherd and Cam stopes to the 10th Level, stoping of virgin low-grade areas to the 16th Level and pillar removal to the 21st Level in the Cam Spur Lode; stoping and pillar removal to the 24th Level in the Cam Spur H/W, Cam H/W and Cam Parallel Lodes, sinking of two 12 ft. dia. winzes to the 28th Level and stoping of the Cam S. Ext. Lode to the 31st Level.

The cost of this work, completed in November, 1956, was £56,100, including the installation on the 30th Level of three further 50 h.p. Macard fans in parallel and a fourth fan on the 2nd Level Petrol, the result of which was to step up the total quantity circulating to 200,000 c.f.m., of which 150,000 c.f.m. was allocated to the lower half of the mine.

The upcast airway for the bottom levels was still, as in the past, the Sub-Circular Shaft. To convert this to a downcast airway and to continue the new Petrol upcast airway to depth to link up with the deep-level exploration area, a system of 60 deg., 12ft. dia. ventilation winzes was planned. This work, begun in December, 1955, is to cost £40,000. A similar parallel series is scheduled for a later date. With this new upcast in operation, planning for the installation of the main 500,000 c.f.m. surface exhaust unit will be possible.

In the meantime the mine is being divided into isolated ventilation districts operating in parallel from the main airways, each with its independent return airway connected to the main upcast so that circulation of heated air is kept to a minimum.

On the 40th Level 50,000 c.f.m. is now being circulated for ventilation of the sinking shaft and the lower development area, the shaft being ventilated by a 45 h.p., 25,000 c.f.m. Safanco fan through 30-in. dia. vent-tubing. Other main development ends are ventilated by 10 h.p. two-stage Axial-Flow fans and 22½-in. dia. vent-tubing.

To maintain wet bulb temperatures at a minimum, semi-dry mining is practised; all shafts have been dried out, covered drains are being extended, new pumping, drainage and machine water systems have been instituted and indiscriminate use of water for drilling and wetting down is prohibited. Dust control is exercised after blasting by special water-blasts which close automatically when the compressed air is turned off and at tips by low-water-consumption foggers. All rock drill machines are "wet-type", front-head vented. Elsewhere dust dilution by fast-moving large-volume air circulation is the rule. At shaft boxes where water sprays oppose the "dry shafts" policy, consideration is being given to small filtration units.

Power, Water Supply and Drainage

Prior to 1952 the mine generated all its own power. Due to coal shortages in the preceding years and an ever-increasing demand from an expanding mine and plant, output lagged behind requirements, and in 1952 a connection to the Electricity Supply Commission's Umniati Station was effected.

Mine maximum demand on this system is now 4,800 kVA. and monthly consumption is approximately 2,300,000 kWH. A portion of the old steam-boiler and generating plant is still maintained for emergency use.

Power is supplied at 33,000 v. and transformed at the Main Mine Sub-station to 2,200 v. Plant and underground transmission is at both 2,200 v. and 550 v., 3-phase, 50 cycles, while domestic power is fed at both 220 v., single-phase, and 440 v., 3-phase and neutral.

The Riddle Nickel Deposit, United States

THE ore mineral at the Riddle nickel deposit is largely garnierite. It occurs as a lateritic concentration in an intricate meshwork of iron- and nickel-stained chalcedony boxwork in sheared and weathered peridotite. In its fresh state, the peridotite contains about 0.2 per cent nickel. The major axis of the orebody strikes north-east and exploration so far has shown it to be roughly 6,000 ft. long and 3,000 ft. wide. The concentration ranges in thickness from a few feet to a maximum of 250 ft.

Exploration of the deposit is being accomplished by churn drilling and trenching. A few test shafts were put down for the purposes of studying the ore in place, determining volume and moisture factors, and gathering bulk samples for pilot plant and smelter tests. In churn drilling, 6-in. casing is driven down every 2 or 3 ft. behind the drill bit and bottomed at each 5-ft. interval. All the sludge for each cased 5-ft. interval is dumped through a splitter and one-eighth is saved and analyzed. Churn drill holes are stopped after going through the ore zone and penetrating fresh peridotite in which the nickel content is less than 0.5 per cent.

Mining of the ore is done by open pit methods, utilizing 2½ cu. yd. diesel shovels and 22-ton diesel trucks. The mining plan being developed at the property consists of a series of level benches, with a 20-ft. maximum height and a 50-ft. minimum width. Each bench is intersected at several points by access roads, for moving the ore from the benches to the crushing and screening plant. The mining operation can be divided broadly into three phrases which are mining and hauling, crushing and screening and, finally, shipping.

The ore is dug from the face of a 20-ft. bench by a 2½-yd. shovel and loaded into 22-ton trucks. The ore is hauled from the benches to a stockpile area in front of the screening plant. The truck loads average about 17 tons and using one shovel it is possible to handle 2,500 tons per shift. Because of the fractured state of the ore in place, practically no blasting is necessary.

In the second phase of the operation, the ore is screened and crushed and deposited by conveyor belt into a conical-shaped surge pile of 25,000-ton capacity to await shipment. The ore is pushed by bulldozer into a hopper which feeds a 54-in. wobbler feeder. This feeder consists of thirteen rotating eliptical manganese bars spaced at 5 in. Over the length of the feeder, the minus 5-in. portion of the ore passes between the wobblers and into a bin from which it is fed by a 42-in. apron feeder on to the 30-in. belt going to the surge pile. The plus 5-in. portion of the ore is carried over the length of the wobbler feeder by its rotating action, and passes into a 30 by 42 jaw crusher set at 5 in.

The crusher product can either be placed on top of the wobbler undersize on the 30-in. belt to the surge pile, or on the 24-in. conveyor belt going to the reject pile. The decision to waste or save the crusher product is made by the engineering staff. The ore on the belt from the plant to the surge pile is sampled at regular intervals as a part of the grade control procedure.

Transporting the ore from the surge pile on the mountain to the smelter stockpile at the foot of the mountain is accomplished by means of a continuous aerial tramway. In a concrete tunnel under the surge pile, the ore is fed by an apron feeder on to a 30-in. conveyor belt which deposits the crushed material in a 100-ton bin, where it is stored before being loaded in the tram cars. The ore is weighed and sampled on the 30-in. belt between the surge pile and the storage bin. A 42-in. apron feeder, electrically controlled, places a measured quantity of ore from the bin into the loader, the door of which is tripped by the moving cars. Once in the car, the ore travels a distance of 8,306 ft. and drops 2,000 ft. in elevation before being deposited at the smelter stockpile. The 50 cu. ft. capacity cars each carry approximately 2½ tons of ore down the mountain at a speed of 500 f.p.m. The cars, spaced 260 ft. apart by a 2-in. connecting cable, travel loaded on 2-in. track cables and return inverted and empty on 1½-in. track cables. The tramway is held to constant speed by two 300 h.p. induction generators, which when the tramcars are fully loaded, generate 500 h.p. in the form of 375 kW. of electricity being returned to the power source. Two 30-h.p. electric motors are utilized in the starting of the tramway to overcome inertia and friction in the system when the cars are empty. Hydraulically controlled brake bands, acting on the drive wheel, effectively bring the tramway to a stop when loaded or empty.

A major problem in the operation of the mine is controlling the grade of ore going to the smelter at 1.5 per cent nickel on the daily basis. Since the formation shows no continuity, the exploration drill holes can be used only for depth, rather than the sample values being projected horizontally. Daily grade control is presently being attempted by horizontal bank sampling of shovel cuts, visual classification of the banks, limiting the width of the shovel cuts to 10 ft. Using these methods, it is necessary to have many cuts available for mining because of the length of time necessary to dry, prepare, and analyze the bank samples. A large number of digging faces are necessary also because of the wide variation in nickel grade over the property. Several areas must be available to make up an average daily shipment.

Since mining operations were started, a little over 1,000,000 tons of ore has been delivered to the smelter.

The article appearing herewith was presented as a paper at the North-west Regional Conference of the American Institute of Mining, Metallurgical and Petroleum Engineers held at Portland, Oregon, from April 11 to 13, 1957. The author, Mr. W. A. Foster, is a geologist with the Hanna Coal and Ore Corporation at Riddle, Oregon. The paper is of particular interest owing to the fact that the Riddle operation is believed to be the only production of nickel in the United States other than won as a by-product material.

MINING MISCELLANY

Signing of a $10,000,000 contract for construction of a uranium processing mill near Grants, N.M., has been announced by the U.S. producer, Homestake Mining Co. Ores from Homestake-Sapin properties and from other producers in the area will be processed by the mill, which will have a daily capacity of 1,500 tons.

★

A lawsuit between Consolidated Diamond Mines and the Administration of South-West Africa over a strip of beach reputed to be rich in diamonds opened in Windhoek on November 12. The company is asking the court for a declaration of its rights, claiming that its concession extends to the low-water mark. The Administration holds that it ends at the high-water mark and has granted a concession stretching 800 yds. out to sea from the high-water mark to S.W.A. Prospectors.

★

The world's largest vehicle has been built by Krupp, of Oberhausen, at a cost of £2,300,000. It is a 5,000-ton dredge travelling on endless tracks, equipped with 150 electric motors totalling 12,000 h.p. and operated by only six men. Built for a lignite mining company to fill in exhausted open-cast mines, which in the Ruhr valley may be over 300 ft. deep, it can move up to 150,000 tons of earth in 20 working hours. The conveying system is 4,900 ft. long by 7 ft. wide.

★

The Anaconda Co. (Canada), a subsidiary of the American corporation, has exercised an option on properties now owned by Lake Superior Iron Ore Co., this deal involving $2,700,000. Ore reserves are believed to exceed 500,000,000 tons of 25 to 30 per cent iron content. Laboratory tests by Battelle Memorial Institute are said to have been very favourable. Facilities capable of producing 500,000 to 2,000,000 tons of concentrates annually are under consideration.

★

It is reported that Communist China has begun preparations for the resumption next year of gold mining on a large scale. In the country's traditional gold belt in Northern Manchuria, bordering the Soviet Union, newly discovered fields, together with the previously worked deposits, are scheduled to yield 120,000 oz. in 1958. A labour force of 15,000 gold miners has already been recruited for the new campaign. Promising finds have also been reported in the more remote provinces, Sinkiang and Mongolia.

★

Directors of American Metal Co., Ltd., and Climax Molybdenum Co. have approved a plan for consolidation and merger of the two companies with American Metal as the surviving corporation under the name American Metal Climax, Inc. If approved by stockholders' meetings on December 30, the merger will become effective at the beginning of 1958. Mr. Harold K. Hochschild will remain honorary chairman of the board. Mr. Arthur H. Bunker, who is now president of Climax, would become chairman of the board of the consolidated corporation. Mr. Walter Hochschild would be vice-chairman of the board and chairman of the executive and finance committees; and Mr. Hans A. Vogelstein, president of the consolidated corporation.

★

The price of coal in the Central African Federation dropped by an average of 7d. a ton at pit mouth for all grades and types on November 1. The Secretary for Mines in Southern Rhodesia, Mr. C. L. Honey, said that this would be the lowest price paid for coal from the Wankie colliery. From 19s. 6d. the average price had dropped to 18s. 11d. a ton. The lower price was made possible through cheaper production costs.

★

A survey of coal and iron deposits in the Province of Leinster is to be started next spring under a technical assistance agreement with the United States Government. The survey, which will cost an estimated £80,000, will be carried out by the Eire Geological Survey Office. The deposits to be evaluated are situated mainly in the Arigna district of County Leitrim, where at present some eight companies are actively mining. The last survey undertaken in this area was carried out by a French firm in 1933-34 and the results were not regarded as satisfactory.

★

Negotiations are under way between two U.S. mining concerns to secure exploration and mining options on sections of the 24 sq. mile concession at present held by Silvermines Lead and Zinc Co., Ltd., at Shallee, County Tipperary, Eire. The company has been actively mining lead, zinc and silver at Shallee for the past decade. During the early years of operations the Eire Government advanced £100,000 to the firm to keep the mines working.

★

The British Newfoundland Corporation (Brinco) has formed partnerships with various other Canadian undertakings in order to broaden and accelerate exploration for minerals in concession areas in Labrador and Newfoundland. The Corporation has obtained new mining exploration and development concessions totalling 1,200 sq. miles in Labrador and 10,000 sq. miles in Newfoundland. British Newfoundland's mineral exploration work, which is being carried out by the subsidiary, British Newfoundland Exploration, has a 1957 budget of about $500,000 and one of the largest programmes of its type of any Canadian company.

★

Last week, we reported that the first copper concentrates from Mangula, in Southern Rhodesia, would shortly be railed. We are advised that railing actually started in the middle of October and by the end of this month will have reached 1,200 s.tons. Thereafter, railing will be approximately 1,200 s.tons of concentrates per month, though it is hoped to double this in 1959.

★

The world's largest titanium alloy ingot, containing 8 per cent manganese and weighing 9,677 lb., was shown by Electro Metallurgical Co., Division of Union Carbide Corporation, at the National Metal Show in Chicago, November 4 to 8. The weight of this ingot is equivalent to more than half the total production of titanium sponge in 1949.

★

During the first half of 1957 Swedish production of iron ore amounted to 9,100,000 tons compared with 8,800,000 tons during the same period of 1956.

★

A total of 2,550 tons of blister copper, valued at £492,420, has been licensed for export from Uganda in 1957.

★

Philippine mineral production for the fiscal year 1956-57 amounted in value to 215,384,126 Philippine pesos, according to the annual report of the Philippine Bureau of Mines. The previous year's production totalled 186,185,520 pesos. About half of the total value of mineral production during the fiscal year 1956-1957 came from sales of base metals, principally copper, chrome and iron.

★

In the first comprehensive publication on peat issued in many years, the Bureau of Mines, U.S. Department of the Interior, estimates that peat bogs in the U.S. cover 79,000,000 acres. The reserves, estimated at nearly 14,000,000,000 tons, are a potential source of heat, power and chemicals, although today all domestic production goes to agricultural uses. In 1955, the latest year covered statistically, U.S. production was approximately 274,000 s.tons, valued at $2,200,000. Imports for that year were 229,000 tons.

★

Poland's imports of zinc concentrates for the current year are put at 140,000 tonnes against 56,000 tons in 1950. Output of zinc metal was 150,000 tons in 1956 against 156,300 tons a year before. The main suppliers of concentrate to Poland are Bulgaria, Yugoslavia, Finland and Hungary. As a result of the expansion of the Skavina aluminium plant, Poland's requirements of alumina have risen sharply and imports for the current year are estimated at 49,000 tons worth $5,500,000. The major suppliers are the U.S.S.R., Hungary and Yugoslavia.

★

According to a report from Peking, China's annual steel production will reach 5,000,000 tons by the end of this year. Coal production will probably total 120,000,000 tons. Aggregates for the first Five-Year Plan, which ends this year, will be 16,000,000 tons of steel and 460,000,000 tons of coal.

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Shipment of manganese ore will soon begin over a 38-mile railway to be built in British Guiana by J. H. Pomeroy and Co., Inc., of San Francisco.

★

Hopes have been roused that a proposal for a "satellite port" and mechanical loading station at Geonkhali, on the lower reaches of the Hoogli River's west bank, will be more actively pursued by the Government of India. The Nisho Co. of Japan, who import iron ore for the Japanese steel industry, have written to the Prime Minister of India, stating that they are very much interested in the Geonkhali proposal. They have offered

deferred credits, extending from seven to ten years, to cover the cost of mechanizing the ore mines in the Bihar-Orissa iron belt, developing rail transport capacity from the mines to the port, and constructing the port itself with its mechanical loading station.

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The Store Norske Spitsbergen Kulkompani, the main Norwegian company mining coal on Spitzbergen, reports that its output during 1956-57 totalled 360,000 tons.

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Dr. C. Jacobsen, head of the chemical laboratory of the Risø Atomic Research Station, Denmark, has stated that extraction of uranium and thorium from Greenland ores is impossible by present methods. The laboratory will endeavour to find an economic method of extraction in co-operation with the Cryolite Co., Oresund, but several years' work might be necessary.

★

Mr. J. Doyle, president of Canadian Javelin, Ltd., has stated that this company's Julian mine deposit is proving to be more important than was originally estimated. Testing of samples has confirmed that the deposit has the same physical characteristics as the original Wabush Lake deposit.

★

The Spanish company, Aluminio Iberico SA, has put forward a proposal to set up an aluminium and aluminium alloy plant in the neighbourhood of Madrid with a capital cost of 300,000,000 pesetas. It suggested that the foreign capital investment should be about 25 per cent. Projected annual production would include 4,000 tons of special alloys for sheet and foil production, 2,000 tons of alloys for the production of sections, and 4,000 tons of virgin aluminium.

PERSONAL

Mr. Arthur Thomas Black has been appointed a director of the Pena Copper Mines, Ltd. Mr. C. W. A. Artis has resigned his directorship due to pressure of other business.

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Senator Theodore F. Green, chairman of the Foreign Relations Committee of the U.S. Senate, visited the High Authority of the European Coal and Steel Community on Thursday, November 7. Senator Green, who is touring NATO capitals and will report to the Foreign Relations Committee on his return, was received by Mr. Max Kohnstamm, Special Adviser to the High Authority.

★

The U.K. is sending a five-man team to Russia to study progress made in underground gasification of coal within the Soviet Union. The party will leave on November 17, and will spend two weeks in the U.S.S.R. A return visit will be made by Russian experts next March. The team consists of Mr. J. Norval, chairman of the underground gasification executive of the National Coal Board; Mr. W. M. Noble, deputy production director of the N.C.B.'s East Midlands division; Dr. A. E. Balfour, deputy head of the underground gasification department in Humphreys and Glasgow, contractors to the Board for the pilot underground gasification project at Newman Spinney, near Chesterfield; Mr. J. H. Lander, of Sir Alexander Gibb and Partners, the N.C.B.'s consultants for Newman Spinney; and Mr. S. E. Warner, of Cremer and Warner, who are also consultants for the Newman Spinney contract. The Russians are known to be engaged on underground gasification at five places: Lisichansk; Angreskaya, near Tashkent; Yuzhno-Obinskaya, in the Kuzbas; Chakhatinsk, in the North Caucasus; and Tula, south of Moscow. In Moscow there is a large Underground Gasification Research Institute, and at Stalino an Underground Gasification Design Institute.

★

Having reached the age of 75 years, and under medical advice, Sir Eric Miller has decided to relinquish the chairmanship of Harrisons and Crosfield, Ltd. He became chairman in 1924 and has presided at every annual general meeting since that date. As a mark of appreciation for his services to the business over 58 years, a resolution will be submitted at the annual meeting appointing him Life President of the Company, while retaining his seat on the board.

★

The Canadian Trade Mission to the U.K. will arrive at London Airport on Friday, November 22. After a comprehensive programme of meetings and visits to atomic research stations and industrial plants, it will reassemble in London on December 16 for final discussions with British ministers and industrialists, returning to Canada on the evening of December 18. Led by Mr. Gordon Churchill, the Minister of Commerce, the mission consists of leading figures from practically every branch of Canadian industry. Among its fifty members are Mr. F. M. A. Noblet (International Nickel), Mr. V. C. Wansbrough (Canadian Metal Mining Association), and Mr. J. B. White (Aluminium of Canada).

★

The death has occurred of Mr. Ernest Charles Dunkerton, a director of Robey and Co., Ltd. Mr. Dunkerton commenced his apprenticeship with the firm in 1888, was appointed a director on January 8, 1923, and rendered 69 years' valuable service. He was a member of the Institution of Mechanical Engineers, a founder member and early president of the British Compressed Air Society, and one of the presidents of the Lincoln Engineering Society.

★

Mr. George C. Wells has been appointed president of Union Carbide International Co., division of Union Carbide Corporation. He succeeds Mr. A. MacKenzie, who reaches normal retirement age this winter after more than 40 years with the Corporation.

★

A short service of dedication of the War Memorial of the Institution of Mining and Metallurgy at 44 Portland Place, London, W.1, was held in the Institution Building at 3.30 p.m. on November 11. The Rev. J. B. Harington Evans, Rector of St. Marylebone Parish Church, officiated. After a reading by Mr. Robert Annan, honorary treasurer of the Institute, the Memorial was unveiled by the president, Mr. G. Keith Allen. The choir was from the Royal Academy of Music, under the direction of the principal, Dr. Thomas Armstrong. The original War Memorial, which was unveiled in 1921 by Field-Marshal the Right Honourable Earl Haig, stood in the Institution's old premises in City Road. It has been adapted for erection in the present house of the Institution, and the Roll of Honour has been completed by adding the names of members who lost their lives while serving in H.M. Forces during the 1939-45 war. The Memorial is now in position on the south wall of the entrance hall.

CONFERENCES AND EXHIBITIONS

The Institution of Mining and Metallurgy and the U.K. Metal Mining Association will hold a Symposium in London during September, 1958, on "The Future of Non-Ferrous Mining in Great Britain and Ireland". It is proposed to discuss the known and prospective occurrences of minerals other than iron and coal, and the problems, both technical and economic, affecting their exploration and development.

★

A Travelling Bursary for a study tour of Swedish mines has been established by the Atlas Copco Organization in collaboration with the Swedish Mining Association. The first tour, of six weeks' duration, will be in March-April, 1958. Further details and forms for application may be obtained from the secretary of the Institution of Mining and Metallurgy.

★

A general meeting of the Cornish Institute of Engineers will be held at 7.15 p.m. on Tuesday, November 19, at the lecture theatre, Camborne School of Mines, when a film will be shown entitled "Milling and Smelting the Sudbury Nickel Ores".

★

The second ordinary general meeting of the Institution of Mining and Metallurgy for the session 1957-58 will be held in the rooms of the Geological Society, Burlington House, Piccadilly, London, W.1, at 5 p.m. on November 21.

★

The first *American Metal Market* Annual Marketing awards were presented in Chicago on November 5. In the copper, lead and zinc classification, the recipient was the New Jersey Zinc Co., for its work in promoting wider and improved applications of the die-casting process, from which the entire industry has benefited.

COMMERCIAL EVENTS

A new London showroom has been opened by C. C. Wakefield and Co., Ltd., at 46 Grosvenor Street, London, W.1.

★

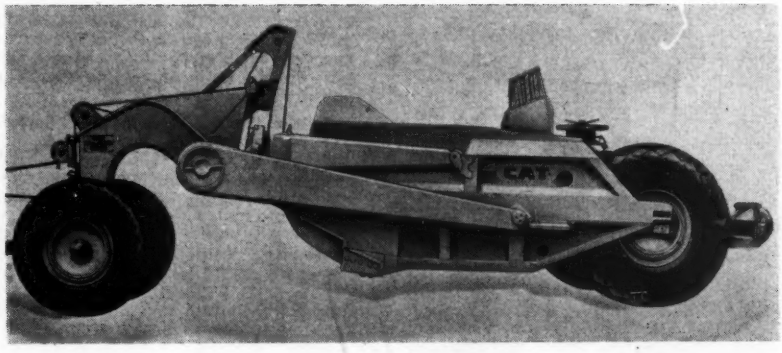
The Bureau of Technical Information has decided to issue a monthly bibliographical bulletin on computers. Issued on the first of each month, it will provide the only complete record available of everything published in the U.K. and overseas on this subject. The publishers are Iota Services, Ltd., 38 Farringdon Street, London, E.C.4, to whom orders for subscriptions (£6 6s. annually) should be sent.

CONTRACTS AND TENDERS

National Free Piston Power, a newly formed company of the Brush Group, is to receive a contract from the Zinc Corporation covering the supply of a free-piston turbo-air compressor plant for installation at Broken Hill (Australia). The plant will consist of three National GS34 free-piston gasifiers, one Brush (series 200) expansion gas turbine, direct coupled to an Oerlikon rotary air compressor. The contract, which is subject only to Australian import regulations, will be supervised on behalf of the Zinc Corporation by R. Bruce and Sons. In the face of international competition, the Brush Group has also secured an order for the supply of three large diesel electric generating sets for the power station to be built at Fria, French Guinea, by an international group of aluminium companies.

Machinery and Equipment

AIR-BORNE DUST POLLUTION



Recent Parliamentary legislation in the field of air-borne dust pollution, calling for higher standards of dust control and more efficient dust collection, has revealed the need for a wet collector of improved design suitable for the widest field of application in both light and heavy industries.

Numerous advantages can be obtained from a properly designed self-induced spray-type wet de-duster, such as a constant resistance to air flow, no secondary dust-disposal hazard, low space requirements, a high collection efficiency independent of unit size, and absence of fire hazard.

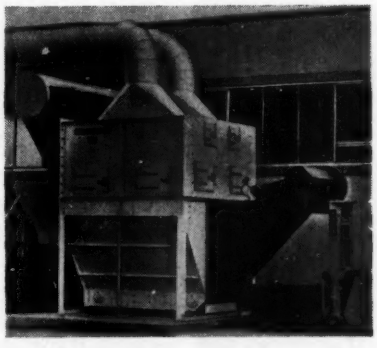
Dallow Lambert and Co., Ltd., now claim to have produced a new range of self-induced spray-type wet de-dusters, specified series MG, which are now available in thirteen standard sizes ranging from 2,000 c.f.m. to 48,000 c.f.m. capac.ty. The de-duster is available with four principal methods of sludge removal.

Type A for mechanical sludge clearance, incorporates a drag-link conveyor automatically controlled to any desired frequency of operation. Type B calls for the whole unit to be elevated above ground level, so facilitating periodic discharge of collected sludge from the bottom tank through quick-release doors into mobile containers. Type C is manual sludge clearance from a bottom tank, is suitable for light dust burdens; and Type D allows sludge or slurry discharge through drain valves.

Among the many applications of interest to the mining industry are in coal and coke preparation, pulverizing, screening and grinding, mechanical handling and tippling. Other uses include ore and slag preparation in the steel industry, statutory dust control for magnesium and titanium machining, and the clearance of explosive dusts.

A LOWBOWL SCRAPER

Lowbowl scraper design has now been made available for use with the Caterpillar D7 tractor, and announcement of



the No. 435 scraper has been made by the Caterpillar Tractor Co., Ltd.

The new, four-wheel scraper, which replaces the Caterpillar No. 70 scraper in the company's line, incorporates many operational and dimensional features which result in higher production and a resultant lower cost per yard moved.

As with the other Caterpillar Lowbowl scrapers, the low silhouette of the No. 435 allows material to enter the scraper with a minimum of lifting effort and material-to-material friction. On a comparative basis, the No. 435 scraper offers 38.6 sq. ft. of bottom area to 31.9 sq. ft. for the No. 70, an increase of 6.7 sq. ft. for the new scraper. This increase helps to provide the new unit with a struck capacity of 13 cu. yd., an increase of 27 per cent over its predecessor model.

Because of its additional width, the No. 435 scraper provides a broader base for heap loading, and can transport 18 cu. yd. of heaped material.

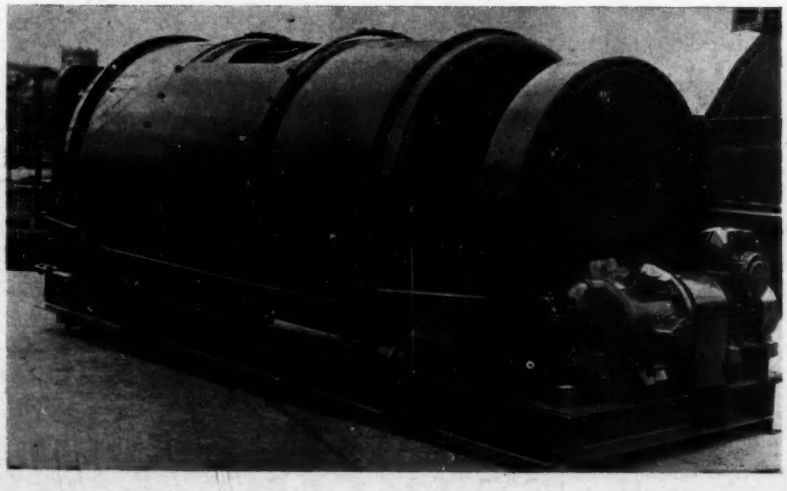
AIR MOTOR POWERS TRANSIT CARS

For lining tunnel walls with concrete, it has been the practice to mix the necessary concrete in the tunnel. This meant that considerable space and time was wasted in moving the equipment in and out of the tunnel.

To overcome this problem, Winget, Ltd., have designed and are now producing a tunnel transit car for carrying 4 cu. yd. of ready-mixed concrete. The transit car is arranged for mounting on a four-wheel transporter bogie, and up to eight cars can be coupled together to be pushed by diesel locomotive down the tunnel. Approximately two minutes are needed to fill a car from a hopper outside the tunnel. By using these cars it is now possible to line the walls on one side of the tunnel, whilst at the same time mucking out the other side.

When designing the car there was the problem of finding a reliable motor for revolving the drum, thereby keeping the concrete fluid. After a number of trials an Atlas Copco air motor type MZK61 was fitted and it revolves the drum at a constant speed of 11 r.p.m.

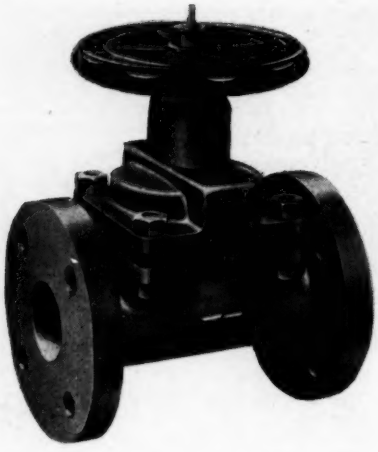
Being air powered, the Atlas Copco air motor cannot be damaged by a wet or damp atmosphere and it also has the added advantage of being reversible, so that if all the concrete is not required it is only necessary to reverse the motor to stop the flow of concrete. The drum is of an all-welded steel construction with



Above: The Caterpillar 435 Lowbowl Scraper

Centre: The Dallow Lambert MG 160 Type A wet deduster

Below: The Winget transit car. The Atlas Copco MZK 61 motor is at right



pressed-steel ends incorporating a special helix screw blading for discharging the batch of ready-mixed concrete into a fixed discharge chute. At the top of the drum is an 18-in. fill door recessed into the drum, complete with a simple slide bar for locking the door into position. The Atlas Copco air motor is direct coupled through a flexible coupling to a worm reduction unit, final drive being by a machine-cut spur reduction gearing.

A GAS-TIGHT SEAL

An ingenious solution to the problem of sealing a small gas-tight container after wires have been passed through the case may have wide applications in the electronics, atomic, and instrument industries. Highly accurate Kelvin Hughes aircraft gyroscopes developed specially for the Smiths Flight System are totally enclosed in a gas-tight case, filled with helium. Lead-in wires to the electrically driven gyro have to be passed through the case without causing a leakage and standard available methods were found to be unacceptable.

A special vacuum seal has, therefore, been developed by Kelvin Hughes for its gyroscopes. Nine fine-drawn copper tubes partly filled with solder are led through the neck of a brass ferrule and "potted" into position with synthetic resin. Wires can be easily soldered to the tubes.

Tests in a hydrogen ionization chamber at a high vacuum have shown no leakage after repeated changes of temperature ranging from − 40 deg. C. to + 70 deg. C. The new seal has shown itself particularly capable of withstanding mechanical and thermal shock and is suitable for temperatures up to + 100 deg. C. The design is such that seals can be adapted to withstand fairly high pressures.

NEW DIAPHRAGM VALVE

A versatile new diaphragm valve has been introduced by Warren, Morrison, Ltd. The new range of diaphragm valves is designed to cater for two main markets not adequately covered by the manufacturers' pinch valves. Firstly, the handling of non-corrosive liquids and gases for which the pinch valve might prove too expensive; and secondly, to handle the really difficult applications too severe for rubber.

For these applications a P.T.F.E. diaphragm and rigid P.V.C. bodies are employed in addition to the normal range of lined metal bodies and synthetic rubber diaphragms. A feature of the valve is that a rising spindle type of position indicator is a standard fitting, enabling the position of the valve to be seen at a glance. The design is such that flexing of the diaphragm is reduced to a minimum to ensure the longest possible life under the most arduous conditions.

RAIL-MOUNTED CRANE

The latest and largest addition to the Coles' range of cranes is a rail-mounted crane Model R5010, "Samson". Designed, manufactured, and marketed by Steels Engineering Products, Ltd., this crane is able to lift 45 l.tons (100,800 lb.) at a radius of 12 ft. when fitted with a 50-ft. centres jib.

The Coles diesel-electric transmission system is featured on this new model. The power plant consists of a 100 h.p. diesel prime mover driving a shunt-wound generator, which in turn supplies current to separate motors for each of the four crane motions of hoist, derrick, slew, and travel.

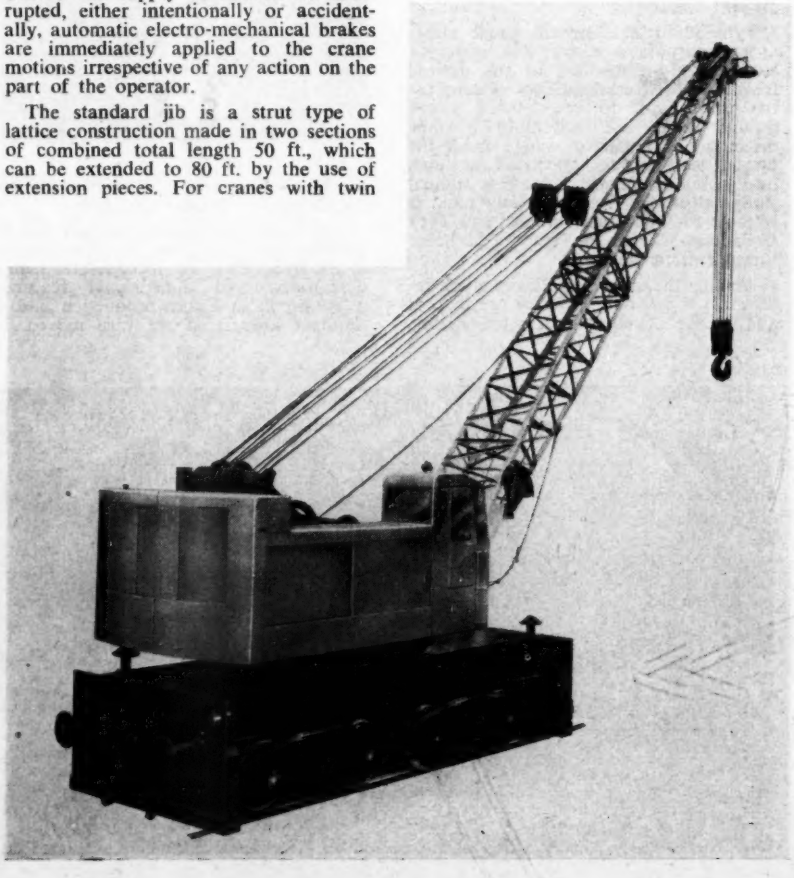
A great advantage of this transmission system is the resulting reduction in fuel consumption, since the engine is not kept running at constant high speeds, power being developed according to need and used efficiently when required. Should the supply of current be interrupted, either intentionally or accidentally, automatic electro-mechanical brakes are immediately applied to the crane motions irrespective of any action on the part of the operator.

The standard jib is a strut type of lattice construction made in two sections of combined total length 50 ft., which can be extended to 80 ft. by the use of extension pieces. For cranes with twin hoisting drums a 25-ft. fly-jib may be used as a straight extension or swan-neck with a maximum offset of 6 ft. from the centre line of the main jib. When fitted with standard jib, the R5010 weighs approximately 84 tons and has a shunting capacity of 400 tons when working on a straight level track.

FINE GRINDING MILLS

The Pulmac mill manufactured by Follsain-Wycliffe Foundries, Ltd., is a high-speed grinder for very fine grinding on a large variety of materials. It can be adjusted to give any required size reduction, from a coarse granulation to an impalpable powder, without a separate screening device. The mill has the advantage of being a dustless installation.

The material is fed into the top hopper mounted on the cast-iron casing and then falls on to an oscillating feed tray. It is then subjected to a combined shearing, beating, crushing, and grinding action by the high-speed impact of the lugs on the rotor beating it against the serrated rings on the stator. Centrifugal force, assisted by the air induced into the mill by the high speed of the revolving rotors, draws the material to the periphery, where it is ejected through holes in a perforated screen. As it is forced from the centre to the periphery, the material is being reduced systematically by the grinding action of the rotor, the breaking-up action of the material beating against itself, centrifugal force, and by the induced air.



Above: The Warren-Morrison diaphragm valve

Below: The Coles R5010 Samson crane

Metals and Minerals

The Expansion of Aluminium Production

The recently announced postponement of part of the Canadian programme for the expansion of aluminium production (*The Mining Journal*, November 1, 1957, page 521) has led to speculation as to the possibility of similar deferments in the U.S., where nearly all primary producers are in the midst of construction programmes.

A few months ago approximately 890,000 s.tons of additional reduction capacity was scheduled to come into operation in North America during 1957 and 1958, of which the projected increases in Canadian facilities accounted for about 170,000 tons. Some of these projects have been completed, while others will be put into operation within the next few months.

The present situation in the U.S. appears to be briefly as follows: Alcoa is considering whether to "phase out" some work on the smelter being built at Warwick, on the Ohio River, near Evansville, Indiana, which is to add 150,000 tons to its annual capacity. The company is definitely going ahead with expansion work at its Port Comfort, Texas, smelter, where 20,000 tons of annual capacity are to be added by March, 1958.

Reynolds Metals has stated that its $285,000,000 expansion programme is proceeding according to schedule. An additional 11,500 tons of capacity will become available late this year or early next year at its Listerhill, Alabama, plant, raising the company's annual capacity to 601,000 tons of aluminium metal. The new Reynolds plant at Massena, N.Y., which will have a yearly capacity of 100,000 tons, is scheduled for completion in the middle of 1959. About a third of this metal will go to an adjoining foundry being built by the Chevrolet division of General Motors Corporation.

Kaiser is nearing completion of its three-year $400,000,000 expansion programme, which will add 145,000 tons to its annual capacity to produce primary aluminium. The new facilities, which include an aluminium reduction and rolling plant at Ravenswood, W. Va., should be in production by the end of next year. No further expansion is at present planned by this company.

The first section of a new aluminium reduction plant being built in Clarington, Ohio, by Ormet Corporation is also scheduled to start production next year. This company is owned jointly by Olin Mathieson Chemical Corporation and Revere Copper and Brass. The announced plans call for an ultimate annual capacity of 180,000 tons.

In Quebec it has been announced that the Canadian British Aluminium Co. will be ready to start operations at its Baie Comeau plant by the end of November this year, the first of three phases of this project having been completed ahead of schedule. Production of aluminium is expected to start early in December.

Canadian exports of primary metal through the first three-quarters of 1957 amounted to about 360,000 tons compared with about 345,000 tons for the corresponding period of last year. So far, therefore, Canada, which has long been the world's largest exporter of aluminium, has evidently succeeded in not merely maintaining but actually increasing its sales volume. With more than enough capacity to supply domestic requirements for some time to come, the U.S. producers are setting up or expanding international sales organizations with a view to the development of export markets. Since adequate supplies are now available in most countries, world markets are likely to become increasingly competitive. A new factor in the export field is the recent appearance of Russian metal of high quality which is being offered at cut rate in order to obtain foreign exchange.

Despite the great increase in metal supply, the outlook for North American producers is still regarded as favourable. Mr. Don Wilmot, vice-president of Alcoa, recently told the National Association of Aluminium Distributors that aluminium products shipments next year could be expected to increase between 5 and 10 per cent over 1957 volume. He noted that aluminium consumption since 1950 had increased by 60 per cent compared with a consumption rise of less than 20 per cent for steel. Consequently the current situation of ample metal supplies had not come about because of a lessening of demand, but rather because of a great increase in supply. At the same meeting, Mr. H. T. Wilder, Alcoa's manager of distribution, emphasized that long-range estimates were for aluminium consumption to double by 1965. Among reasons for optimism, he instanced population growth, a plentiful supply to meet existing and new uses, and advantages of the metal over competing materials.

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Another step towards the increased use of aluminium in the manufacture of cans has been taken by the start of an aluminium-can line at Kaiser's Indiana plant. An initial order has been received for 5,500,000 cans, said to be the first aluminium food cans to be manufactured commercially on a large scale in the United States.

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An agreement between Surinam and Alcoa is to be concluded as a result of discussions which took place at the Hague between the Surinam Premier and the Dutch Government. The subject of the talks was the "Brokopondo Plan" to harness the River Surinam to supply electricity for the processing of bauxite into aluminium. A temporary agreement with the company is about to be finalized, but will have to be approved by the Surinam Parliament. The Netherlands is to finance the Plan to the extent of 173,000,000 guilders, the rest of the money being found by Surinam through domestic loans and loans floated in the United States.

★

Alcan has told its subsidiary, the Demerara Bauxite Co., to slow down the rate of construction on its $60,000,000 alumina project at Mackenzie, which is 60 miles up the Demerara River, British Guiana. The scope of the project is to remain unchanged.

Negotiations have been concluded by the Jamaica Government with the Harvey Aluminium Co. of the U.S., granting the company special exclusive prospecting licences for bauxite mining on all Government-owned lands in six parishes. The company plans to prospect for three years. Harvey needs about 300,000 tons a year of bauxite to supply its aluminium plant at The Dallas, Oregon.

THE MOLYBDENUM SITUATION

Climax Molybdenum Corporation which, as reported on page 583, plans to merge with the American Metal Co., is the largest Free World producer of molybdenum. Output of this metal has been affected by the long strike at the Corporation's Langeloth, Pa., plant, which started on July 1 and still continues, although it is hoped that a settlement may soon be reached. One effect of this strike has been the postponement of the decision to halt sulphide shipments to Europe in favour of shipments of technical oxide to consumers.

In the U.S. itself, supplies of molybdenum are currently inadequate, despite the fact that the company has secured additional roasting facilities in Canada, which are to some extent alleviating the consequences of the Langeloth strike. Customers' inventories are generally very low and it will take many months of full production to satisfy the backlog of demand.

In order to make more molybdenum available for future industrial growth, Climax has succeeded in securing the cancellation of its "low-grade" contract with the U.S. Government. This contract was signed some years ago, when it appeared possible that a large volume of low-grade ore might be rendered permanently unworkable by new developments at the Climax Mine. Due to technical progress, the cost of molybdenum recovered from the low-grade area proved less than had been anticipated, with the result that the U.S. Government has lately been able to divert deliveries from this source from the stockpile to U.S. industry at the prevailing price. Cancellation of this contract should enable the corporation to devote a higher proportion of its resources to the production of normal grade ore, with favourable effects on the future supply position.

NEW CALEDONIA NICKEL

The French New Caledonian nickel producer, Le Nickel, plans to raise its productive capacity to 27,000 tons of metal by 1960. These plans extend a 1955 development programme, which originally aimed at 22,000-ton capacity by the end of 1958. The new programme provides for the expansion of the company's facilities at Le Havre from 7,000 to 14,000 - 15,000 tons a year. The whole development plan will cost an estimated Frs.3,500 million, comprising 1,500 million for a new 25,000 kW. coal-

burning power station at Noumea in New Caledonia and 2,000 million for the refinery.

On the Continent the price of nickel metal is now put at from £900 to £1,100 per ton on the free market, compared with £1,000 to £1,200 a few weeks ago. In the U.K. the free price is approaching more closely to the fixed price of £600 per ton, a range of from £700 to £800 being indicated. The demand for the metal remains quite good, but buyers are unwilling to cover more than their essential requirements because of the progressively easing world supply position.

DISPOSAL OF BERYLLIUM COPPER

The U.K. Board of Trade have announced their intention to dispose of 37 tons of beryllium copper master alloy with a beryllium content of about 4 per cent. This material is being offered for sale by open tender for delivery in December and January. Forms of tender will be obtainable from the Board of Trade, Theobalds Road, London, W.C.1.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

The weaker sentiment in the lead, zinc and tin markets has now spread to the copper market and the trend on the London Metal Exchange is distinctly more "bearish" than it was a week ago. This has been reflected in lower prices in all cases except the tin market, where the three months' quotation has firmed up on the expectation that an early meeting of the International Tin Council will be called to decide on methods of curtailing export from producing countries should the present rate of intake to the Buffer Pool continue.

COPPER'S WEAKER UNDERTONE

In spite of an increase in the selling price of Belgian copper at the end of last week, the undertone of the copper market has undergone a change brought about by the settlement of the labour situation in Chile, the continued decline on Wall Street and the realization that steps to bring about a greater measure of equilibrium between production and consumption are very difficult to initiate: members of the market point out that all the various attempts in the past to stabilize prices without reducing production have failed and that if all those interested in copper wish to see a measure of stability, this can only be brought about in present circumstances by an overall reduction in output. Business on the Exchange has remained brisk and with stocks at the beginning of the week showing little change, there has been little alteration in the contango.

In America, customs smelters have cut the price of electrolytic copper by ¼ c. to 25½ c. Recent slow buying interest by fabricators at 26 c. and the decline in London induced this price decrease. The producers' price of 27 c. per lb. seems to be fairly secure, as the impression is that any reduction in price would not bring additional business.

TIN COUNCIL TO HOLD SPECIAL MEETING

There have been few features in the tin market, where the Manager of the Buffer Stock continues to be a buyer at £730 per ton for cash metal and the Eastern market continues at a level which permits hedging in London. The news that there will be a special meeting of the Tin Council towards the middle of December has given rise to much comment and the majority feel that the agenda will be to discuss the imposition of export quotas as soon as the Buffer Stock Manager has purchased 10,000 tons of tin. It is expected too that participants will be given notice that a second instalment of tin or cash will also be called for.

On Thursday morning the Eastern price was equivalent to £718½ per ton c.i.f. Europe.

LOWER LEAD/ZINC PRICES

The lead and zinc markets both show declines in prices over the week, although consumption remains at a reasonable level with special attention being paid to high-grade zinc for the motor car industry. The probable reason for the weakness is the publication of U.S. statistics for the two metals which show that in the case of lead during the month of August there was still an over-supply although consumption was the highest so far in 1957: it is interesting to note that imports remain at a high figure and it is expected that these will remain so long as there is a possibility that there may be an increase in the import duty on the metal.

The figures for zinc which have been published referred to the month of October and these showed that apart from a small rise in stocks the quantity absorbed into the stockpile also increased. Since this latter operation may cease by the end of the year, merchants have taken a "bearish" view of the outlook even though at present price levels, shipments of some raw materials to the smelters are being held up. The general opinion of the market is that if there is no great weakness in copper and no further decline in industrial activity both in Europe and in the States, the prices of both lead and zinc are now at a level which renders attractive the building up of stocks.

Closing prices are as follows:

	Nov. 7 *Buyers*	*Sellers*	Nov. 14 *Buyers*	*Sellers*
Copper				
Cash	£194	£194½	£188½	£189
Three months	£197	£198	£192½	£193
Settlement	£194½		£189	
Week's turnover	7,250 tons		5,850 tons	
Lead				
Current ½ month	£87½	£87¾	£84	£84½
Three months	£87	£87½	£84½	£84¾
Week's turnover	3,525 tons		4,575 tons	
Tin				
Cash	£730	£730½	£730	£730½
Three months	£715½	£716	£718½	£719
Settlement	£730½		£730½	
Week's turnover	1,725 tons		1,650 tons	
Zinc				
Current ½ month	£69	£69½	£67½	£67½
Three months	£68½	£68½	£67½	£67½
Week's turnover	4,300 tons		7,250 tons	

LONDON METAL AND ORE PRICES, NOV. 14, 1957

METAL PRICES

Aluminium, 99.5%, £197 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £190 per ton
Crude (70%) £190 per ton
Ore (60%) basis 20s. 0d./21s. 0d. nom. per unit, c.i.f.
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 11s. 3d. lb.
Cerium (99% nett), £13 18s. lb. delivered U.K.
Chromium, Cr. 99% 7s. 2d. lb.
Cobalt, 16s. lb.
Germanium, 99.99%, Ge. kilo lots 3s. 4d. per gram
Gold, 249s. 8½d.
Iridium, £27/29 oz. nom.
Lanthanum (98/99%) 15s. per gram
Manganese Metal (96%-98%) £310
Magnesium, 2s. 5½d. lb.
Nickel, 99.5% (home trade) £600 per ton
Osmium, £20/22 oz. nom.
Osmiridium, nom.
Palladium, £7 10s./£8 0s. oz.
Platinum U.K. and Empire Refined £30/£31 oz.
Imported £28 0s./£28 10s. nom.
Quicksilver, £71 0s. ex-warehouse
Rhodium, £42 oz.
Ruthenium, £15/£17 oz. nom.
Selenium, 67s. 9d. per lb.
Silver, 78½d. f. oz. spot and 78d. f'd.
Tellurium, 15s. 16s. lb.

ORES AND OXIDES

Bismuth	65% 8s. 6d. lb. c.i.f. 18/20% 1s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semifriable) 48%	£19 5s. 0d. per ton c.i.f.
" Hard Lumpy 45%	£19 5s. 0d. per ton c.i.f.
" Refractory 40%	£13 0s. 0d. per ton c.i.f.
" Smalls 44%	£16 0s. 0d. per ton c.i.f.
Baluchistan 48%	£12 0s. 0d. per ton f.o.b.
Columbite, 65% combined oxides, high grade	nom.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF_2)	156s. 0d. ex works
Lithium Ore—	
Petalite min. 3½% Li_2O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O	£26 5s. per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£22 0s. d/d
Manganese Ore Indian	
Europe (46%-48%) basis 95s. freight	125d./127d. per unit c.i.f. nom.
Manganese Ore (43%-45%)	98d./100d. per unit c.i.f. nom.
Manganese Ore (38%-40%)	92d./94d. per unit nom. (including duty)
Molybdenite (85% basis)	8s. 5d. nom. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO_2 (prompt delivery)	£45/£47 per ton c.i.f. Aust'n
Ilmenite 52/54% TiO_2	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	106s. 0d./111s. 0d. per unit c.i.f.
Vanadium—	
Fused oxide 90-95% V_2O_5	£10 per unit c.i.f.
Zircon Sand (Australian) (65-66% ZrO_2)	£17 per ton c.i.f.

Mining Finance

The West Wits Portfolio

The publication of the West Witwatersrand Areas annual report covering operations for the year ended June 30, 1957, draws attention to the Company's portfolio, which is comprised largely of sound, high-grade, long-life mines.

Shareholdings (000)	*Price* (12.11.57)	*Value* (£000)
3,002 Blyvooruitzicht ...	19/9	2,964
1,826 Doornfontein ...	21/6	1,963
2,221 Libanon	7/-	777
1,024 Venterspost	12/9	653
1,444 West Driefontein	86/3	6,227
20 Wit. Deep	2/3	2
		12,586

The Company's interest in Carletonville Estates figures in the balance sheet at £222,000 and taking into account excess of other assets over liabilities amounting to £999,000, the total value is £13,807,000, equivalent to about 41s. per share. This assessment excludes West Wits' interest in Western Deep Levels, which can be reasonably assessed at 2s. 6d. per share. Thus the present market price of approximately 36s. per share does not adequately reflect the intrinsic worth of the company's assets.

While some of the companies listed above have reached a somewhat static position, there can be no doubt of the expansion potential of West Driefontein, Doornfontein and Blyvoor. Moreover, the portfolio stands to benefit materially from any rise in the gold price.

INCO'S SMALLER PROFITS

The International Nickel Company of Canada's net earnings during the first nine months of this year, in terms of U.S. currency, totalled $66,017,000 equivalent to $4.52 per common share, which compares with net earnings of $72,594,000 or $4.87 per common share in the first nine months of 1956, which constituted record earnings for any nine months' period in the company's history.

In the interim report issued by Dr. J. F. Thompson, chairman, and Mr. Henry S. Wingate, president, it is stated that the reasons for the reduction in earnings were reduced copper prices, increased operating costs, the strike at the Huntington (West Virginia) plant, and reduced deliveries of platinum metals. Higher prices for nickel and mill products were partially offsetting factors.

Earnings in the September quarter totalled $20,416,000 equal to $1.40 per common share compared with $22,097.000 or $1.51 per common share in the June quarter and $1.61 per common share in the first quarter of this year. The outstanding 7 per cent Preferred stock was redeemed last February.

LONDON MARKET HIGHLIGHTS

The week to November 13 saw the beginnings of yet another breakaway from the low levels of both business and prices in the South African gold share market. The better tendency seemed to stem from news of the rich 3,264 in. dwt. strike in the new No. 3 Shaft at Western Holdings. After that, business gradually picked up as buyers, looking for an end-year rise in the market generally, came in for the shares of newer mines. The result was that W. Holdings advanced solidly to 81s. 3d., Free State Geduld to 80s. 7½d. and among many others "Ofsits" reflected the strength of the O.F.S. group as a whole with a rise of 5s. to 57s. Harmony, at a peak since 1955 of 31s., were also helped by optimistic estimates of their future milling grade. Another firm spot was "Freddies" which gained ground on Cape buying to 5s. 6d.; it was thought that the buying was "inspired", but just what was causing the inspiration was generally conceded to be anybody's guess. Klerksdorp dropped quickly to only 2s. 3d. on the uranium announcement, but later rallied to 2s. 10½d. on a more optimistic view of the outlook and the fact that if a market is found for the company's production the shares would be immediately several times this price. In a rather firmer Diamond group, "Casts" (24s. 4½d. xd.) responded to the preliminary profit figures. Platinums also hardened, but interest remained small.

Copper shares fluctuated rather uncertainly with Wall Street and the metal price. Rhodesia-Katanga provided the outstanding movement when following the news of flooding at the Kansanshi mine, reports were received indicating that the mine was to be closed down. "Rho-Kats" immediately slumped 10s. to only 7s. 6d., but on a more hopeful reading of the situation, they later rallied to 11s. Roan Antelope became a particularly active market on an optimistic comment on the company's prospects in the Sunday Press. The shares jumped to 9s., but later began to fall away as profit-takers took their opportunity before the arrival of the Roan and R.S.T. September quarterly reports which are expected this week-end. Messina issues were depressed at one time on the sharply reduced final dividend, the shares falling to 92s. 6d. and the options to 43s. 1½d. Later, bear-closing following the Mangula share offer news, caused a quick turn-round in the position and the shares recovered to 101s. 3d. and the options to 50s. 7½d.

Lead-zincs remained steady in rather subdued trading. Despite the tiny yield (2.3 per cent) following the recent dividend cut, Mount Isa (26s. 3d.) continued to attract the occasional buyer on their long-term investment possibilities. Tin shares tended to improve. The talk of a likely output restriction scheme which quickly affected the metal market played no part in the share market. Siamese fell on their sharp dividend reduction to 9s., but "break-up" possibilities lifted the undervalued Ipoh shares to 12s. 6d. Kepong (4s. 6d.) rose on the higher dividend and profits.

Elsewhere, Rio Tinto issues continued to attract attention. The new shares were a particularly lively market and fluctuated wildly at around 9s. premium. The recent firmness of Lake View and Star (21s. 6d.) proved to be well founded when news was released of the higher dividend and substantial tax savings of this company which qualifies as an Overseas Trade Corporation.

SIAMESE TIN TO CLOSE DOWN FIVE DREDGES

In announcing a second interim of 6d. per unit for the year to December 31, 1957, Siamese Tin draw attention to the fact, foreshadowed in the chairman's review in June, that of the ten dredges at present in operation, five will be closed down for all or part of 1958, and that group earnings will, therefore, be considerably less than in 1956. However, the directors point out that the company is likely to receive some O.T.C. benefits, and that two extensively modernized dredges will begin working long-life properties in the early part of 1959. Dividends in 1956 totalled 3s., while distributions to date this year amount to 10½d.

LOWER EARNINGS OF ALUMINIUM LTD.

Net income of Aluminium Ltd. during the first nine months of this year at $30,925,894 represented a substantial drop from the net earnings in the comparable period in 1956 totalling $42,325,290.

The slump in profits is attributed to the four-month strike at the Arvida works coupled with the reduced demand for aluminium. In this latter connection, it is pointed out that sales for the third quarter were cut by nearly $10,000,000 worth of deferments of deliveries to U.S. producers under long-term contracts and amounted to $85,000,000, compared with $112,000,000 in the September quarter of 1956.

With consumption of aluminium insufficient to absorb present total output, the company is postponing the construction of new aluminium smelting facilities previously scheduled to come into operation in 1958 which would have expanded the company's ingot capacity from the present figure of 770,000 tons to 850,000 tons annually. The readjustments in expansion will, it is estimated, reduce capital expenditure in 1958-59 by approximately $30,000,000.

SOUTH AFRICA—"A GREAT PLACE FOR INVESTMENT"

Increasing interest in the gold price and, in some respects even more important for investors in South African gold shares, a fuller appreciation of in-

vestment opportunities in South Africa is emphasized by the report from Johannesburg of a statement by Mr. Charles Englehard, chairman of Englehard Industries of America. Speaking to U.S. businessmen there Mr. Englehard said he hoped there would be an increase in the price of gold as he believed it would be to the benefit of the whole world to have a sound and stable standard of currency.

Financial News and Results

Malayan Tin and Southern Malayan.—Both Malayan Tin Dredging and Southern Malayan Tin made drastically lower profits last year, and in each case expected O.T.C. benefits have borne the major part of the burden. Malayan Tin earned £549,643 before tax in the year to June 30, 1957, against £1,052,793 in the previous period, but profits tax took only £153,204 compared with £580,146 from income and profits taxes, leaving net earnings at £396,439 (£472,647) in 1956. Southern Malayan's figures for the same period are: Gross earnings £486,075 (£787,653); profits tax £167,647 (income and profits tax £466,191); net profit £318,428 (£321,462). Both meetings will be held in London on December 19.

"Johnnies" to Buy 250,000 "Chartered".—Johannesburg Consolidated have entered into an agreement with New Rhodesia Investments whereby the Rhodesia company will arrange for 250,000 "Chartered" to be sold to Johnnies at 58s. As consideration Johnnies (subject to Treasury consent) will issue 600,000 J.C.I. to New Rhodesia at 55s.

Who'll Buy My Sweet Uranium?—The South African Atomic Energy Board have told Klerksdorp Consolidated Goldfields that the Combined Development Agency do not wish to purchase Klerksdorp's prospective uranium output. While negotiations are proceeding with other possible buyers, prospecting and development at the mine have been suspended.

Good Crop From Lydenburg Gold Farms.—In the year ended June 30, 1957, Lydenburg Gold Farms made a taxed profit of £51,170. This compares with £26,616 in the preceding year. The dividend is accordingly increased to 2½d. from last year's 2¼d. The chairman, Mr. M. E. Rich, says that since income from investments is now sufficient to cover a reasonable rate of dividend, interims are a possibility. Meeting Johannesburg, November 29.

Rooiberg Minerals Development.—An increase to £136,121 in working profit for the year to June 30 last has made it possible for Rooiberg Minerals Development to resume distributions with a total of 12½ per cent for the year. Net profits after tax were £132,451, against £116,620. Work on electrification of the whole mine should be complete by the end of the year. Meeting, Johannesburg, November 28. Mr. A. W. Stewart is chairman.

The One That Got Away.—Group accounts for London and Rhodesian Mining and Land Co., for whom a recent abortive bid was made by Glazer Bros., show net profits after tax in the year to June 30, 1957, somewhat lower at £48,720 (1956: £60,066). However, tax refunds of £20,590 (£2,224 last year) brought the year's total earnings to £69,310, sufficient to cover the unchanged dividend of 10 per cent absorbing £57,500. Sir Joseph Ball is chairman. Meeting, London, November 28.

Peña Copper Mines.—Peña Copper Mines announce that their "reorganization" general meeting will be held immediately after the annual meeting scheduled for December 9. Resolutions will be put reorganizing and consolidating the company's capital, changing the name of the company to Peña Industries Ltd., and amending the articles of association. Peña's only connection with mining at the present time is a subsidiary operating a small wolfram mine at Callington, Cornwall.

C.M.F.S.A.—The meeting announced in July at which Central Mining Free State Areas is to be placed in liquidation, will be held on November 18 in Johannesburg. Liquidation proposals are one Harmony share for every six C.M.F.S.A. plus a final distribution in cash. Since the close of the financial year the company has disposed of all holdings except that in Harmony, which has been enlarged to 2,000,000. At the date of the balance sheet, cash and net liquid assets amounted to £280,267, which should now have increased to about £406,316 from the change in portfolio. This is equivalent to about 8d. per share.

Casts Cut Final, Make Scrip Issue.—Preliminary group figures from Consolidated African Selection Trust reveal net taxed profits fractionally lower in the year to June 30, 1957, totalling £876,951 against the previous period's £861,395. The final dividend recommended is cut to 3s. 6d., but the total of 5s. for the year is unchanged. Treasury consent has been obtained for a one-for-one scrip issue, involving the capitalization of £1,516,554 of reserves. Meeting, London, December 12.

Rand & Orange Free State Returns for October

Company	October 1957 Tons (000)	Yield (oz.)	Profit† (£000)	Year ends	Current Financial Year Total to date Tons (000)	Yield (oz.)	Profit† (£000)	Last Financial Year Total to date Tons (000)	Yield (oz.)	Profit† (£000)
Goldfields										
Doornfontein	86	35,733	185·8	J	342	140,455	741·8	290	114,518	505·2
Libanon	103	23,011	52·9	J	500	91,709	213·5	384	85,773	217·1
Luipaards Vlei	75	13,468	4·5	J	298	52,924	42·4	339	60,693	43·7
Rietfontein	24	5,653	16·0	D	243	56,551	161·7	258	58,496	178·1
Robinson	78	16,376	12·1	D	759	155,658	99·0	779	156,720	45·9
Simmer & Jack	97	18,192	19·0	D	962	178,238	187·8	1,018	178,826	171·7
Sub Nigel	66	16,795	28·0	J	264	67,274	112·3	266	77,562	232·2
Venterspost	121	29,324	54·2	J	495	118,750	236·1	502	108,609	277·2
Vlakfontein	49	17,514	84·0	D	494	177,105	853·0	446	159,817	790·7
Vogels	99	22,646	50·0	D	988	228,288	704·8	1,003	248,489	838·4
West Drie	75	71,982	590·0	J	300	287,284	2457·8	300	278,304	2298·0
Anglo American										
Brakpan	124	19,036	17·1	D	1,096	183,308	132·8	1,070	181,942	127·7
Daggas	226	48,043	260·2	D	2,277	497,092	2718·5	2,209	499,478	2823·5
East Daggas	93	15,492	33·0	D	945	156,479	343·9	952	156,451	338·8
F. S. Geduld	64	44,810	310·1	S	64	44,810	310·1	46	20,341	8·2
Loraine	61	12,152	L8·8	S	61	12,152	L8·8	59	11,185	L8·6
President Brand	71	53,210	430·1	S	71	53,210	430·1	60	45,815	379·7
President Steyn	94	35,723	196·2	S	94	35,723	196·2	82	31,981	177·7
S. A. Lands	88	17,877	54·0	D	199	189,417	616·2	898	188,839	650·1
Springs	127	14,373	9·1	D	1,266	138,814	66·5	1,262	152,672	102·2
Vaal Reefs	66	30,263	180·6	D	615	272,026	1615·0	292	105,808	497·7
Welkom	82	24,339	64·0	S	82	24,339	64·0	80	20,000	34·8
Western Holdgs.	99	50,435	370·1	S	99	50,435	370·1	88	38,939	251·8
Western Reef Ex.	116	26,905	70·1	D	1,220	265,816	655·7	1,198	343,210	491·0
Central Mining										
Blyvoor	106	63,550	451·9	J	422	251,772	1820·1	433	242,667	1793·9
City Deep	157	29,690	11·0	D	1,492	292,406	159·6	1,536	296,897	39·5
Cons. M.R.	153	23,313	9·5	J	750	94,340	38·9	673	93,299	39·9
Crown	239	35,722	11·8	D	2,389	348,857	14·8	2,859	441,816	204·1
D. Roodepoort	185	33,212	53·0	D	2,033	322,536	515·1	1,833	316,048	524·7
E. Rand Prop.	234	57,636	142·8	D	2,202	562,289	1318·6	2,125	551,497	1791·0
Harmony	82	32,397	162·0	J	342	135,810	708·7	313	123,310	681·6
Modder East	142	14,130	3·1	J	567	318,466	14·1	564	57,710	36·2
Rose Deep	53	7,882	0·9	D	500	75,395	4·7	442	70,683	5·0
J.C.I.*										
E. Champ d'Or	12	390	L25·2	D	121	3,401	L264·3	138	8,093	L266·8
Freddies Cons.	54	18,119	L8·0	D	566	157,313	L156·2	608	125,037	L353·2
Govt. G.M.A.	62	10,754	1·0	D	957	162,349	L61·8	2,346	298,955	16·3
Randfontein	38	6,354	3·1	D	654	109,248	87·0	—	—	—
Union										
East Geduld	130	39,983	278·2	D	1,368	420,085	2959·5	1,444	445,541	3187·5
Geduld Prop.	87	13,721	14·8	D	978	154,983	237·9	1,040	165,060	323·4
Grootvlei	205	43,656	229·1	D	1,963	419,726	2213·0	1,959	422,119	2302·5
Marievale	74	19,355	86·4	D	713	187,178	841·6	713	187,219	866·7
St. Helena	120	34,805	191·7	D	1,165	339,374	1872·0	1,082	313,951	1710·6
Van Dyk	78	14,745	30·0	D	775	135,355	186·0	801	129,953	16·8
General Mining										
Buffelsfontein	112	35,992	177·4	J	446	144,726	807·5	—	—	—
Ellaton	32	7,544	27·4	D	325	70,752	196·1	321	73,499	273·0
S. Roodepoort	31	7,091	26·5	J	120	27,878	102·5	117	27,167	99·8
Stilfontein	110	53,200	366·8	D	1,016	458,946	2987·2	893	352,085	2077·1
W. Rand Cons.	134	18,729	8·3	D	1,415	203,016	145·8	2,216	237,079	L945·3
Anglo-Transvaal										
Hartebeestfontein	86	47,730	326·9	J	344	190,490	1309·4	270	132,153	785·3
N. Klerksdorp	12	1,197	L7·3	D	117	12,203	L59·9	109	12,410	L50·9
Rand Leases	174	26,622	10·2	J	694	108,765	49·8	721	111,102	28·3
Village M.R.	32	5,318	4·4	J	134	22,058	26·1	132	20,292	34·6
Virginia O.F.S.	101	27,270	71·8	J	404	108,480	289·9	351	62,877	215·5
Others										
N. Kleinfontein	97	12,414	1·5	D	989	116,945	43·0	1,039	122,663	9·6
Wit. Nigel	17	4,091	4·6	J	71	16,984	12·1	72	15,938	29·6

Gold has been valued at 249s. 3d. (September 250s. 5d.) per oz. fine. L indicates loss. †Working Profit. *Working Profit includes sundry revenue. Table excludes profits from Uranium, Pyrite and Acid, and also production from Uranium divisions at Luipaards Vlei, Randfontein and W. Rand Consolidated.

JOHANNESBURG CONSOLIDATED INVESTMENT COMPANY

(Incorporated in the Union of South Africa)

EXTRACT FROM MR. D. A. B. WATSON'S SPEECH

The annual general meeting of the Johannesburg Consolidated Investment Company, Limited, was held on November 12 in Johannesburg.

Mr. D. A. B. Watson, who presided in the unavoidable absence of Mr. H. J. Joel, the Chairman, said:—

The Balance Sheet reflects a further substantial increase in the investment portfolio, the book value of our investments having increased during the year by £1,638,000. After allowing for the amount of £301,000 applied from Investment Reserve in reduction of the book value of certain holdings, the net amount invested during the year was £1,939,000.

Current assets of £3,335,422 exceeded current liabilities of £2,666,640 by £668,782, compared with £1,723,311 in 1956.

The net profit before providing for taxation amounted to £2,469,000, an increase of £177,000 over that of the previous year. This increase was the net result of greater income from investments and the realization of investments, offset by a reduction in the net income from fees and sundries.

An amount of £871,000 was provided for taxation in respect of the financial year under review.

After making the transfer of £801,000 to Investment Reserve, your Directors were pleased to be able to declare a dividend of 5s. for the year. This distribution showed an increase of 1s. 6d. on the dividend of 3s. 6d., which, with one exception, has been paid each year since 1948. The increased dividend has left the carry-forward practically unchanged.

Because income from investments is at present our main source of profit, it is the principal factor governing the rate of dividend, although this rate may naturally be influenced also by other factors. Although we have substantial investments in South African gold mines, the bulk of our present investment income is derived from our diamond, copper, platinum, base metal and industrial interests.

After reviewing the various fields of investment, Mr. Watson summed up by saying:

In so far as our interests in diamonds, platinum, copper and other base metals are concerned, the picture is, with the exception of diamonds, one of a period of hesitancy with production generally in excess of demand and a consequential weakness in the price of the various metals. It would appear that some period of readjustment must elapse before any general material increase in price occurs, but how long this period will last it is at present difficult to assess.

As I mentioned earlier, there was a net investment of the Company's funds during the year of approximately £1.9 million, some of which has not yet earned a full year's income. Because of this, and provided there is no significant further weakening in the markets for the various commodities in which your Company is interested, it is the opinion of your Board that our income from these investments, taken as a whole, will be substantially maintained during the current year. Furthermore, having regard to the wide field of your Company's mining investments, it is likely that they will yield satisfactory returns over the long term. In this connection, I wish to refer to an agreement which has very recently been made with New Rhodesia Investments, Limited, of which shareholders were informed in a circular issued last week on Thursday, November 7. The following is the full text of the circular:

"The Board has decided to take advantage of an opportunity which has recently arisen to acquire a substantial investment in the British South Africa Company, while at the same time supplementing the Company's cash resources. For this purpose the Company has entered into an agreement with New Rhodesia Investments, Limited, whereby the latter will procure the sale to the Company of 250,000 Ordinary Stock Units of 15s. each of the British South Africa Company (ex the final dividend for the year to September 30, 1957) for cash at the price of 58s. per Stock Unit.

"New Rhodesia Investments, Limited, has also agreed to subscribe at the same time for cash at the price of 55s. per share for 600,000 shares of £1 each of the Company ranking *pari passu* in all respects with the existing issued shares.

"The subscription proceeds, so far as not required for completing the acquisition of the British South Africa Company investment, will be utilized for the general purposes of the Company.

"These arrangements are subject to the consent of the United Kingdom Treasury being granted to the proposed issue of shares, and application has been made for this purpose."

Your Company's industrial interests also cover a relatively wide field and it appears at present that our income from this source will not vary to any significant extent during the next few years.

After reviewing conditions in the coal mining industry, Mr. Watson, commenting on uranium and gold, said:

The future of the South African uranium industry does not by any means depend solely on the continued production of uranium by those mines where it arises as a by-product and whose position as uranium producers will not be directly affected by mining costs. It depends also to a large extent upon the primary producers whose competitive position will be directly affected by mining costs. In the case of uranium as in the case of gold, future mining costs are therefore of national concern.

The present and short-term future picture of the gold mining industry as a whole is one of expanding gold production, but this should not be allowed to deflect attention from the serious problems with which this country will be faced if the cost of gold mining continues to increase. The production of gold is likely to expand during the next few years, but a stage will be reached when production will decline with the closure of the older mines. If gold mining is then to continue to fill its fundamental rôle in the South African economy, the replacement of worked-out mines in so far as this may be possible remains a continuing necessity. If working costs continue to rise while the price received for the metal remains static, it will require the discovery of a progressively higher grade of ore to justify the flotation of new mining companies. This requirement will reduce the likelihood of such discoveries being made.

HARRISONS & CROSFIELD, LIMITED

SIR LEONARD PATON'S STATEMENT

The annual general meeting of Harrisons and Crosfield, Limited, will be held on December 9 in London.

The following is an extract from the circulated statement of the chairman, **Sir Leonard Paton, C.B.E., M.C.,** for the year to June 30, 1957:—

Having reached the age of 75, and on medical advice, Sir Eric Miller has resigned the chair he has held since 1924, but remains a Director. His colleagues agree that his load must now be lightened, but they have sought how best to mark his exceptional services. Hence, Stockholders are being asked to approve a new clause in the Articles of Association naming him Life President. My colleagues have done me the honour of inviting me to succeed Sir Eric as Chairman.

The Group Profits for the year, after charging £881,828 for taxation, amounted to £561,352. The directors recommend a final dividend of 10 per cent on the Deferred Ordinary Stock, making 15 per cent for the year. This repeats last year's distribution.

Strong Liquid Position

The main feature of the Consolidated Balance Sheet is the strong liquid position. Net Current Assets have risen during the year to £6,413,000 excluding Trade Investments. In the stringent credit conditions now ruling Stockholders can take satisfaction from the knowledge that available resources are ample both for current needs and for new opportunities. Group Reserves amount to £4,359,000.

Our interest and responsibilities in Malaya extend to upwards of 200,000 acres, the contribution from which to the economy includes many millions of dollars paid annually in wages, capital expenditure, and taxation. We have long had deep roots in Malaya, and try to be in the forefront of every move to advance the interests of the country and the people.

Tea and Rubber

Tea: With the knowledge that in total there is ample tea available, and with pressure of supplies tending to lower the price of plainer qualities, it has been possible for blenders to pay high prices both in London and in the East for best quality teas, in the knowledge that their overall cost is unlikely to rise to the extent necessary to force an increase in retail prices. Overall production of tea in the world continues to expand, and it is not easy to see where the extra tea will be absorbed. Output in the main producing countries outside China in 1957 will probably prove to be some 40,000,000 lb. in excess of that in 1956.

Rubber: The year has not been without difficulty for the industry. Opening under the shadow of Suez, with prices at a relatively high level, there has been a steady drift downwards in line with most other primary commodities. Rubber in the past has had its testing periods, and in common with other commodities will have them again. But the world cannot do without rubber, and there seems no reason to qualify Sir Eric Miller's often expressed conviction that in an expanding world economy there is plenty of room both for natural rubber and synthetic in the foreseeable future.

HARMONY GOLD MINING COMPANY LIMITED

The Seventh Ordinary General Meeting of Harmony Gold Mining Company, Limited, will be held in Johannesburg on Monday, November 18, 1957. The following is an extract from the circulated statement of the chairman, **Mr. P. H. Anderson.**

The rate of milling during the year under review averaged nearly 79,000 tons per month, the total ore milled being 947,000 tons compared with 897,000 tons in the previous year. The yield per ton was 7.806 dwt., which was 0.101 dwt. higher than that in the previous financial year. In spite of the increase in the tonnage milled, the higher cost of pneumoconiosis compensation charges, European labour, electric power, and the disposal of underground water, resulted in a rise of 9d. per ton milled in working costs. The working profit from gold was £1,935,174 and from uranium and pyrite £1,174,633 (subject to adjustment), making a total working profit for the year of £3,109,807, equivalent to 65s. 8d. per ton milled, which was an improvement of 2s. 1d. compared with the previous year. Dividends amounting to 1s. per share, or £900,000, were paid during the year, and £2,109,612 was transferred to Capital Reserve. The unappropriated balance of Income and Expenditure Account stood at £1,263,307 at the end of the year, showing an increase of £77,972. After repaying £336,195 of the Company's capital indebtedness in respect of loan facilities arranged through the Atomic Energy Board for the construction of the uranium and pyrite plants, the balance still owing at July 1, 1957, was £3,221,689, redeemable in 32 equal quarterly instalments from July 1, 1957.

Development

Full-scale sinking and equipping of No. 2 Shaft began on September 5, 1956, and at September 30, 1957, the shaft had been sunk to a depth of 4,600 ft. below the collar, concrete-lined to a depth of 4,546 ft. and equipped to a depth of 4,396 ft. In order to keep up the supply of ore to the mill, it was necessary to restrict development operations and the footage developed during the year at 42,400 ft. was 8,948 less than that accomplished in the previous year. 11,995 ft. were sampled, 9,695 ft. or 80.8 per cent proving payable at an average value of 546 in. dwt. It is hoped to bring No. 2 Shaft into commission during the first half of 1958, and thereafter it is planned to accelerate development operations. At September 30, 1957, the 17th Haulage West had passed the position of No. 2 Shaft and the excavation of the ancillary crosscuts to the shaft station had been started. The first of the twin winzes to be sunk to the north of No. 2 Shaft pillar area had advanced 242 ft. at that date.

The present daily installed pumping capacity of the mine is approximately 8,700,000 gallons and the capacity is being further increased.

The payable ore developed during the year amounted to 1,178,000 tons of an average gold value of 8.9 dwt. and an average uranium oxide value of 0.683 lb. per ton over an estimated stoping width of 50.7 in. The available ore reserve recalculated at the year end totalled 2,039,000 tons, which is 339,000 tons greater than at June 30, 1956. At 8.7 dwt. the average value of the available reserve was 0.2 dwt. higher than last year, while the stoping width was 2.5 in. less at 51.8 in.

Expansion in the Scale of Operations

The Company's plans for expanding the scale of mining operations have been put in hand and the construction work to increase the capacities of both the gold and uranium plants has started. An application has been submitted to the Atomic Energy Board to extend the capacity of the pyrite flotation plant and to erect a sulphuric acid plant.

During the year a net amount of £1,885,011 was spent on capital account in respect of gold mining. During the current financial year it is expected that approximately £2,900,000 will be spent on capital account. As announced in the Press, the Company has arranged loan facilities to the extent of £2,000,000 with Central Mining Finance, Limited. The facilities will be drawn upon in equal quarterly instalments of £500,000 carrying interest at 6¼ per cent per annum on amounts drawn and 1 per cent on the undrawn balance, and the first drawing will be made on October 31, 1957. The loan will be repaid in equal half-yearly instalments commencing on June 30, 1960, but the whole or any part of it may be repaid at any time after December, 31, 1959, on payment of a premium of 3 per cent. The loan, together with appropriations from profits, will provide the funds necessary to meet the cost of the capital programme for the current year.

Dividend No. 3 at the rate of 9d. per share was declared on September 13, 1957.

BLYVOORUITZICHT GOLD MINING COMPANY, LIMITED

The Twentieth Ordinary General Meeting of Blyvooruitzicht Gold Mining Company, Limited, will be held in Johannesburg, on Tuesday, November 19, 1957. The following is an extract from the circulated statement of the chairman, **Mr. W. M. Frames.**

The tonnage of ore milled during the year at 1,264,000 was 3,000 tons lower than that for the previous year. The yield at 11.367 dwt. per ton was 0.109 dwt. higher and the gold recovered increased by 5,201 oz. to 718,409 oz. The higher gold output, together with the slightly higher average amount received per oz. for gold, resulted in an improvement in the working revenue of £99,092 to £9,057,464. Due principally to higher labour charges, working costs increased to £3,801,652, with the result that the working profit from gold rose by £48,520 to £5,255,812. Due to improvements to the uranium plant, the tonnage of slimes treated increased to 1,866,011 tons and, as a result of better recovery practice, uranium oxide production increased from 518,088 to 563,454 lb. The working profit from uranium and acid (subject to adjustment) accordingly rose by £219,659 to £1,412,423. The total working profit from gold and uranium and acid (subject to adjustment) at £6,668,235 was higher by £268,179 than in the previous year. The net profit for the year, before providing for taxation and mineral lease consideration was £6,619,288. Provision for taxation and mineral lease consideration amounted to £3,263,279, dividends declared totalled £2,400,000, a repayment on account of the capital portion of the uranium and acid loans absorbed £408,429 and £237,521 was transferred to Capital Reserve.

Development

Development footage totalled 54,267 ft., which was 1,039 ft. more than for the previous year. 18,630 ft. were sampled and 16,655 ft., or 89.4 per cent, were payable. Compared with the previous year, the percentage payability was lower by 5.2 per cent, but there was an increase from 764 to 940 in. dwt. in the value. The increase in value was largely due to satisfactory development exposures in the lower central and eastern portions of the mine. Exploratory work was continued in the western section, where values were lower than the average for the mine. The opening up of the mine below the sixth level by means of the "A" series of incline shafts, proceeded at a satisfactory rate and a record shaft footage of 2,181 was sunk during the year. In the view of the Company's Technical Advisers, the sinking of the proposed sub-vertical shafts can safely be deferred until the incline shaft systems are completed. As the underground workings grow bigger the mine has to cope with more water, and in order to keep well ahead of requirements the pumping capacity was increased from 16,800,000 to 18,500,000 gallons per day and still further pumping equipment is being installed.

The available ore reserve was re-estimated at June 30, 1957, at 4,820,000 tons of an average value of 12.8 dwt. over a stoping width of 45.7 in. There was a small increase in the pay limit to counteract the rise in costs. Compared with the previous year, the ore reserve fell by 521,000 tons, the value being 0.7 dwt. higher and the width 0.7 in. less. The value of the uranium contained in the available ore reserve was 0.424 lb. per ton.

A net amount of £254,532 was spent on capital account for gold mining operations during the year. It is estimated that £490,000 will be spent on capital account for gold mining during the current financial year. Expenditure on the uranium and acid plants totalled £20,108 and £398,915 respectively. An amount of approximately £140,000 remains to be spent on the completion of these plants. Of the total loan of £4,068,281 obtained through the Atomic Energy Board for the erection of the uranium plant, an amount of £1,317,221 had been repaid by September 30, 1957, leaving £2,751,060 to be repaid.

The sulphuric acid plant was commissioned on October 27, 1956, and has operated at its designed capacity since that date. The loan of £757,601 arranged through the Atomic Energy Board to finance the construction of this plant, is repayable by quarterly instalments over a period of ten years, the first of which took place on March 31, 1957. At September 30, 1957, an amount of £47,093 had been repaid, leaving a balance of £710,508 to be repaid.

Western Deep Levels, Limited

Western Deep Levels, Limited, registered during August, 1957, has been formed to exploit an area of approximately 4,767 morgen lying immediately to the south of the properties of this Company and West Driefontein Gold Mining Company, Limited.

RIEBEECK GOLD MINING COMPANY LIMITED

(Incorporated in the Union of South Africa)

PROGRESS OF INITIAL PROGRAMME

MR. B. L. BERNSTEIN'S REVIEW

The 1st annual general meeting of Riebeeck Gold Mining Company, Limited, will be held on December 5 in Johannesburg.

The following is the circulated review of the chairman, **Mr. B. L. Bernstein:** Your Company was incorporated on March 21, 1956. The authorized capital of £3,500,000 was subscribed at par in December, 1956. In addition, the Company will raise, in terms of the flotation arrangements, an additional £2,000,000 either by way of an issue of shares to shareholders or by way of loan. The provision of this amount has been guaranteed by the Companies that sponsored the issue of shares.

The amount of £5,500,000 thus provided will enable your Company to carry out the first stage of opening up the mine. The initial programme provides for the sinking and equipping of one large vertical shaft together with ancillary surface buildings and plant, as well as the development of twin haulages on the 4,800 ft. level from the Loraine No. 2 shaft into your Company's property. It is anticipated that the shaft will be sunk to a depth of 5,800 ft. When sinking has been completed, a limited amount of development will be undertaken. Further capital will have to be raised in due course to complete the underground development programme to build the reduction works, and to equip the mine for production.

Preparatory Work Completed

Work at the property commenced during January, 1957. All preparatory work, including some permanent installations, has now been completed and it is estimated that full-scale shaft sinking will commence during November, 1957. No. 1 shaft is circular with a diameter of 26 ft. inside the concrete lining. Permanent equipment will be installed as the shaft is sunk and in addition a concrete bratice wall will be installed to divide the shaft into downcast and upcast airways. The shaft collar had been completed to a depth of 88 ft. by the end of September, 1957. The concrete headgear, which is 150 ft. high and is the first of its type in the Orange Free State, is already completed. You will find further details of progress achieved in the report of the Consulting Engineers attached to the Annual Report.

Provided there are no excessive delays, the sinking of the shaft should be completed by the middle of 1959, when development operations will commence.

Agreement with Loraine Gold Mines Limited

An agreement was concluded with Loraine Gold Mines, Limited, whereby Loraine undertook to develop a twin cross-cut on the 4,800 ft. horizon from its No. 2 shaft towards the K1 Borehole and then to continue a twin haulage into your Company's property. Loraine contributed to the cost of the haulage until it reached a point 1,000 ft. south of Borehole K1. From that point the total cost has been borne by your Company. In the vicinity of Borehole K1 the haulage passed through upper bands of the "Rainbow Reef" and, as published in the Press, by Loraine Gold Mines, Limited, of 380 ft. sampled, 345 ft. were payable at an average value of 369 in. dwt. The haulage reached the common boundary between Loraine and Riebeeck at the end of July, 1957, and is now being driven towards Borehole TV2. At the end of September, 1957, the return airway and companion haulage had reached positions of 838 ft. and 652 ft. respectively inside the Riebeeck property. The purpose to be served by this haulage is to provide, in due course, a second outlet for the Riebeeck Mine. Although it is not intended to carry out exploratory reef development at the present time, the haulage has intersected several reef horizons, the results of which were published in the report for the quarter ended September 30, 1957. It is anticipated that further reef bands will be traversed.

Apart from such reef exposures as may arise as a result of the twin haulage passing through reef horizons, no reef development will be undertaken until the sinking of No. 1 shaft has been completed, as it is proposed to devote the available funds to development in the vicinity of No. 1 shaft, from which area it is anticipated the initial mill tonnage will be derived.

Many practical problems in the field present themselves when a new mine is started. The good progress made on your mine is largely due to the co-operation and hard work of all those concerned. I would like to take this opportunity of placing on record your Board's appreciation of the services of the Manager of the Mine, Mr. A. R. Louw, and his staff and the staffs at both the Head and London offices of the Company.

RAND LEASES

(Incorporated in the Union of South Africa)

RESULTS AFFECTED BY UNDERGROUND FIRE

MR. S. G. MENELL'S REVIEW

The 25th annual general meeting of Rand Leases (Vogelstruisfontein) Gold Mining Company, Limited, will be held on November 29 in Johannesburg.

The following is the review by the chairman, **Mr. S. G. Menell,** which has been circulated with the report and accounts:

The results obtained during the year under review were adversely affected by an underground fire which caused a complete stoppage of production, with the exception of the Kimberley Reef section, during the period November 30, 1956, to December 24, 1956. Normal production was not resumed until December 27, 1956. During the fire-fighting operations the lower levels of the mine were flooded and in the Tertiary Shaft area development operations could not be resumed until February, 1957. Of the loss incurred during the fire, an amount of £184,430, which includes £8,384 loss of profits, was recovered under insurance policies.

The tonnage milled decreased by 204,000 tons to 1,939,000 tons and the recovery grade, at 3.125 dwt. per ton, was 0.049 dwt. per ton lower as compared with the previous year. Working costs increased by 1s. to 39s. 1d. per ton due mainly to the interruption of normal mining operations and to non-recoverable expenses incurred as a result of the fire. Development costs showed a decrease of 1s. 2d. to 3s. 9d. per ton milled.

The total working profit for the year, including sundry revenue and £8,384 loss of profits recovered under insurance, was £71,190, equivalent to 9d. per ton milled as compared with £261,178, equivalent to 2s. 5d. per ton milled, for the previous year.

Operations

In conformity with the policy outlined in my previous review, development footage decreased by 29,241 ft. to 51,850 ft., resulting in a corresponding drop in the footage sampled from 45,060 ft. to 27,775 ft. Payability increased from 43.1 per cent to 45.5 per cent.

In the area below the 36th level, development on the Main Reef Series during the year amounted to 16,236 ft., bringing the total accomplished in this area up to June 30, 1957, to 25,012 ft. Of the latter amount, 18,851 ft. have been accomplished in the area served by No. 1 Tertiary Shaft and of 3,165 ft. sampled, 2,000 ft. (63.2 per cent) was payable at an average value of 11.74 dwt. per ton over a channel width of 23.5 in., equivalent to 276 in. dwt. In the area west of 36-0 Development winze the total development up to June 30, 1957, was 6,161 ft. and of 3,720 ft. sampled, 1,835 ft. (49.3 per cent) proved payable at an average value of 7.52 dwt. per ton over a channel width of 26.6 in., equivalent to 200 in. dwt.

Ore Reserves

The total ore reserve, recalculated as at June 30, 1957, amounted to 2,951,000 tons, having an average value of 4.13 dwt. per ton over an estimated stoping width of 45.7 in. Compared with the ore reserve as at June 30, 1956, there is a decrease of 901,000 tons, with an increase in value of 0.13 dwt. per ton and a decrease in the estimated stoping width of 1.6 in. The decrease in the ore reserve is due mainly to the increase in working costs with a corresponding increase in the pay limits.

The programme of intensive sweeping and reclamation in the upper levels of the mine, to which I referred in my review last year, is progressing satisfactorily. The tonnage from reclamation, sweeping and sundry sources has increased by 4.0 per cent to 15.6 per cent of the total tons mined and steps are being taken to increase still further the tonnage obtained from these sources.

The capital expenditure programme, to which reference has been made in previous years, will come to an end soon with the completion of the work in connection with No. 1 Tertiary Shaft. Expenditure on capital account during the present year is expected to be of the order of £35,000 and it is envisaged that appropriations in subsequent years will be still further reduced.

Pneumoconiosis Act

The Pneumoconiosis Act which came into force last year was introduced for the purpose of consolidating and amending the law relating to the payment of silicosis compensation and covers the group of diseases now falling under the heading of "pneumoconiosis". The benefits payable have been increased in

respect of future cases and also retrospectively to all existing cases. The State has accepted responsibility for the latter, but benefits in respect of future cases will have to be provided by the mines through increased annual levies.

At March 31, 1956, the Company's share of the outstanding liabilities under the Silicosis Act, 1946, was assessed at £210,558. Full provision has now been made for the outstanding liabilities, and your Company will not be required to make any further contributions.

This concludes my review of the year's operations, and I desire to place on record your Board's appreciation of the services rendered by the Manager of the Mine, Mr. A. L. A. Forder, and his staff, as well as the staff at both the Head Office and London Offices of the Company.

ONE 6-in. BANKA DRILL with 64 ft. of Casing and Rods and all Tools, including Hollow Jack; can be seen by arrangement at Milestones, Sidlescombe, Battle, Sussex.

GEOLOGIST REQUIRED with minimum several years' experience to conduct new exploration programme in East Africa. This is an interesting and responsible position with the possibility of permanency and further travel. Interviews will be arranged in London. Applications, please, to the Mining Engineer, Northern Mercantile & Investment Corporation, Ltd., City Wall House, 84-90 Chiswell Street, London, E.C.1.

A LARGE MINING COMPANY REQUIRES the services of an experienced FIELD ENGINEER to assist in the prospecting of an extensive mineral concession in Ghana. Previous experience in prospecting for lode and alluvial minerals is essential. Salary will be in accordance with experience and qualifications. Write stating age and experience to Box E9405, Whites, Ltd., 72-78 Fleet Street, London, E.C.4.

CANADA

Opportunities exist in the expanding Petroleum and Metal-Mining Industries in SASKATCHEWAN for qualified personnel in the under-mentioned categories. Both Government and Industrial posts are available.

* GEOLOGIST (Precambrian Survey). Post-Graduate experience desirable.
* GEOLOGISTS (Sedimentary). Post-Graduate experience desirable.
* PETROLEUM ENGINEERS.
* MINING ENGINEERS.
* CIVIL ENGINEERS.
* CHEMICAL ENGINEERS.

Please apply, with personal information, and brief details of training and experience, to: Box No. 577, c/o W. S. Crawford Ltd., 233 High Holborn, London, W.C.1.

Publications Received

A list of Milling Plants in Canada, Part I, Metallic Ores, has been issued by the Department of Mines and Technical Surveys, Ottawa. Price 25 c.

*

The Nellore mica belt is surveyed by Dr. B. C. Roy, in a Bulletin issued by the Geological Survey of India, Series A, Economic Geology, No. 11. Price Rs.3 or 5s.

*

The first edition of *Mining Laws of Canada*, was published in 1924. The fifth edition, by H. A. Graves and G. R. L. Potter, has been published by the Department of Mines and Technical Surveys, Ottawa, Mines Branch No. 854. Price $1.

*

The report of the Mines Department, Ghana, for the period April 1, 1955, to March 31, 1956, has now been issued. Copies are available from the Government Printing Department (Publications Branch), Accra, Ghana, and from the Crown Agents for Oversea Governments and Administrations, 4 Millbank, London, S.W.1. Price 2s. 6d.

*

The second annual Symposium on Mining Research, sponsored jointly by the University of Missouri School of Mines and Metallurgy and the U.S. Bureau of Mines, took place on November 12 and 13, 1956. The proceedings have now been published by the University of Missouri School of Mines and Metallurgy, Rolla, Missouri, as Technical Series Bulletin No. 94, 1957.

*

The Seventh Edition of the Gauge and Tool Makers' Association Handbook is now available. It includes a comprehensive Buyers' Guide Index to the products of the 350 member companies. Copies will be sent, free of charge, to all actual and potential buyers of British tools and gauges. Application should be made to the Association at Standbrook House, Old Bond Street, London, W.1 (telephone Hyde Park 3451-2).

*

Principles of Geochemical Prospecting, by H. E. Hawkes, has been issued by the U.S. Department of the Interior as Geological Survey Bulletin 1000-F. Some suggestions for the execution of geochemical surveys and the interpretation of geochemical data are presented. Copies can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price 40 c.

*

An informative publication entitled *Minerals, Canada and the World*, has been issued by the Mineral Resources Division, Department of Mines and Technical Surveys, Ottawa, together with a Statistical Supplement. Copies of the book are available from the Division at $1 each and of the Statistical Supplement at 50 c. Prepared primarily as an aid to members of the Sixth Commonwealth Mining and Metallurgical Congress in understanding Canada's mineral industry, this publication shows the Dominion's contribution to world production of almost all major minerals. It contains a comprehensive series of maps and coloured graphs supplemented by text. Output figures are shown for almost all nations, including Russia.

CONSOLIDATED MAIN REEF MINES AND ESTATE, LIMITED

The Fifty-ninth Annual Meeting of shareholders will be held in Johannesburg on November 19, 1957. The following is an extract from the circulated statement by the Chairman, **Mr. T. Reekie**, dated November 12, 1957.

Working Results

During the financial year 2,000,000 tons of ore were milled, with an average yield of 2.765 dwt. per ton. Compared with the figures for the previous year, these results reflect decreases of 35,000 tons and 0.051 dwt. per ton respectively and, despite a slight rise in the average income received by the Company per oz. of gold, the total working revenue declined to £3,486,029 from the previous year's total of £3,597,002.

Total working expenditure, at £3,361,950, was lower by £44,313 on account of the lower tonnage milled but, due principally to increased costs in respect of pneumoconiosis contributions, unit working costs were higher by 1d. per ton milled.

Resulting from these variations the working profit for the year fell by £66,660 to £124,079.

Accounts

The excess of sundry income over sundry expenditure was £55,047 and the total profit for the year amounted to £179,126. After providing £8,117 for taxation and adding the unappropriated balance of £391,884 brought forward from the previous year, a total of £562,893 was available for appropriation. Two dividends of 1s. 6d. and 1s. 3d. per share respectively, totalling £171,545, were declared and having allowed for a re-transfer from Capital Reserve of £12,673 in respect of the realization of certain mining assets and trade investments, an unappropriated balance of £404,021 was left to be carried forward to the current financial year's accounts.

Due to the increased benefits provided under the Pneumoconiosis Act, 1956, which has been in force since August 1, 1956, the cost to the Company under this heading rose by 6d. to 1s. 8d. per ton milled for the year under review.

Development and Ore Reserve

There was a slight increase in both the development footage and the tonnage of payable ore developed. As stated on previous occasions, this work is now confined to selected areas and to secondary development. The available ore reserve declined further by 539,000 tons to 1,241,000 tons.

Position at the Mine

As pointed out in the Consulting Engineer's Report for the past year, it has been difficult to maintain a profitable grade. It has now been decided to make a gradual reduction in the scale of operations as much of the marginal tonnage has become uneconomic, but by eliminating this tonnage and by mining Nos. 4 and 8 Shaft pillars, it is hoped to be able to maintain a reasonable profit.

With effect from September 1, 1957, Rand Mines, Limited, the Secretaries to the Company, were also appointed Consulting Engineers and Technical Advisers on taking over from Central Mining Finance, Limited, that Company's executive and technical departments.